



# Imperial Bureau of Plant Breeding and Genetics

## Plant Breeding Abstracts

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\* General studies, see also individual crops.

# PLANT BREEDING ABSTRACTS

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# Plant Breeding Abstracts.

Vol. XV, No. 1.

## Part I. Empire Section

### PURE SCIENCE 5

1. FERSMAN, A. 5(47)  
**Science in the U.S.S.R.**  
Advanc. Sci. 1944 : 3 : No. 9 : 62-77.

A comprehensive review is given of the present position of science in the U.S.S.R. After a brief historical introduction, the principles governing scientific research are described. The philosophical basis of science is held to be dialectical materialism as developed by Marx and Lenin, with a special emphasis on the Hegelian notion of historical process as the outcome of the conflict of antinomies. Causality is accepted as a fundamental and necessary tenet of materialism. Systematization and the reduction of scientific law to mathematical terms are regarded as among the more important scientific procedures.

In the realm of biology, Darwinism is once again upheld as the fundamental doctrine, but it should be realized that the author's use of this term, following the schools of thought founded by Michurin and Lysenko, does not conform to the usage outside of the U.S.S.R.

Consideration is then given to the application of science, this being regarded as its primary purpose. Questions of organization and the integration of different branches of science are discussed and the need for popularizing scientific views is stressed. Scientific development is believed to be related essentially to the State and the reciprocal influence of the two is touched upon.

### \*STATISTICS 519

2. CORNISH, E. A. 519.24:631.421  
**The recovery of inter-block information in quasi-factorial designs with incomplete data. 2. Lattice squares.**  
Bull. Coun. Sci. Industr. Res. Aust. 1944 : No. 175 : Pp. 19.

An approximate method is described for recovering information from quasi-factorial designs in which the data are incomplete.

3. MAHALANOBIS, P. C. 519.24:631.421  
**Statistical definition of standard yield of crops.**  
Sankhyā : Indian J. Statist. 1942 : 6 : 97-98.

A short general discussion of the object of crop experiments is presented. Since the yields on two different plots will not have a constant ratio under varying seasonal conditions, it is necessary to find the number, size, and geographical distribution of plots which will give the greatest information with a limited total expenditure. Such an arrangement is usually found only after a number of trials. C. A. B. S.

4. RAO, C. R. 519.24:631.421  
**Quasi-latin squares in experimental arrangements.**  
Curr. Sci. 1943 : 12 : 322-23.

This letter refers to an extensive paper shortly to be published by the author, and gives an idea of the generality of the approach. Thus, if there are  $n$  equal squares and  $v$  treatments, the only restriction considered is that no treatment occurs more than once in the same row or column with the same square. The intra-group and inter-group balanced design of the incomplete blocks, and the partially balanced design, then occur as special cases. S. N. C.

5. SAUNDERS, A. R. 519.24:631.421(68)  
**Efficiency of design in field experiment at Potchefstroom, South Africa.**  
Emp. J. Exp. Agric. 1944 : 12 : 157-62.

A comparison has been made between the efficiencies of the following lay-outs: lattice, balanced lattice, lattice-square, balanced incomplete blocks and split plots.

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\* General studies, see also individual crops.



6. PHIPPS, I. F.,  
PUGSLEY, A. T.,  
HOCKLEY, S. R. and  
CORNISH, E. A. 519.24:631.421:633.11

**The analysis of cubic lattice designs in varietal trials.**

Bull. Coun. Sci. Industr. Res. Aust. 1944 : No. 176 : Pp. 40.

The method of recovering information from cubic lattice designs is described with special reference to wheat variety tests.

7. IRWIN, J. O. and  
KENDALL, M. G. 519.271.3  
**Sampling moments of moments for a finite population.**  
Ann. Eugen. 1944 : 12 : 138-42.

After a remark on certain product moments of  $k$ -statistics, the paper gives an improved theoretical method of arriving at results achieved previously by Isserlis and Tschuprow. The results are expressions for the first four moments of the sample mean, the first two moments of the variance, and the variance of the third  $k$ -statistic to order  $1/N$ . S. N. C.

8. SEKAR, C. C. 519.271.3  
**Distribution of Fisher's  $g_1$  for samples of three from a continuous rectangular distribution.**  
Curr. Sci. 1944 : 13 : 10-11.

Taking  $\tau_i = \frac{x_i - \bar{x}}{S}$ , where  $\bar{x} = \frac{1}{3} \sum_{i=1}^3 x_i$ ;  $S_2 = \frac{1}{3} \sum_{i=1}^3 (x_i - \bar{x})^2$ , and considering the sequence  $\tau_1', \tau_2', \tau_3'$  formed by the  $\tau$ 's in ascending order of absolute magnitude, the author derives the distribution of Fisher's  $g_1$  for samples of three from a rectangular distribution. The corresponding result is quoted for a normal distribution. S. N. C.

**\*BREEDING 575**

9. STEPHENS, S. G. 575:575.1  
**The application of genetics to plant breeding.**  
Trop. Agriculture, Trin. 1944 : 21 : 126-29.

The application of genetics to plant breeding is discussed, special emphasis being placed on taxonomic and cytogenetical studies, on statistical genetics, and on the possibilities foreshadowed by developmental genetics.

10. 575:633(41)  
**Scottish Society for Research in Plant Breeding. Report by the Directors and Report by the Director of Research to the Annual General Meeting 20th July, 1944 : Pp. 34.**

**Wheat**

The society's selection of Iron III has been named Scottish Iron III.

**Oats**

Progress has been made in breeding for resistance to premature germination, especially by the development of the progenies of a cross with wild oats.

**Barley**

Selection B8 (8) has been named Craig's Triumph.

**Potato**

Breeding for combined resistance to blight and viruses A and X continues, using the progenies of triple crosses between *Solanum Rybinii*, *S. demissum* and *S. tuberosum*. Attempts to utilize the disease resisting properties of *S. polyadenium* have been hampered by the low fertility of the progenies of the interspecific crosses. Two new viruses are described from the material introduced from South America. Seedlings resistant to leaf roll have been raised.

**Swede**

Potentially self-fertile lines have been obtained. Progress in hybridization and selection is described.

\* General studies, see also individual crops.



**Kale**

Crosses between perpetual kale and marrow-stem and curly kales have been obtained.

**Broccoli**

Breeding for winter-hardiness is under way.

**Bean**

Russian material is being used in an attempt to develop early varieties.

11. WATERS, H. B. 575:633(66.7)

**Agriculture in the Gold Coast.**

Emp. J. Exp. Agric. 1944 : 12 : 83-102.

Reference is made in this review to various plant breeding projects. Guinea-corn and cassava have been improved and an attempt is being made to develop cocoa varieties resistant to swollen shoot.

12. ARNOLD, H. C. 575:633(68.9)

**Agricultural Experiment Station, Salisbury. Annual report of experiments, season 1942-1943.**

Rhod. Agric. J. 1944 : 41 : 208-25.

**Soya bean**

Selection work with Hernon strains is continuing and hybridization experiments between Hernon and Potchefstroom No. 184 have been initiated.

**Velvet bean**

The hybrid strains Marbilee and Jubilack are being developed for greater uniformity.

13. 575:633(72.92)

**Annual Report of the Department of Agriculture for the year ended 31st March, 1943.**

Jamaica 1944: Pp. 20.

**Maize**

Yellow varieties are being developed by selection to replace the native red types.

**Banana**

Crosses between Gros Michel and wild *Musa* species are being carried forward. A few promising seedlings have been obtained from crosses between tetraploid varieties.

14. HARRINGTON, J. B. 575:633(73)

**Observations on plant breeding and seed distribution in the United States.**

Rep. 11th Annu. Mtg Univ. Sask., Canad. Seed Gr. Ass. 1940 : 20-29.

A review of plant breeding projects in the U.S.A. is presented, together with an account of the organization of seed distribution.

15. 575:633(93.1)

**Eighteenth Annual Report of the Department of Scientific and Industrial Research, New Zealand 1944 : Pp. 57.****Wheat**

Promising selections are being developed from the cross Tuscan x Tainui.

**Oats**

Several promising lines have been selected from the crosses Resistance x Onward and Garton's Abundance x Ruakura.

**Forage grasses**

Special attention is being paid to rye-grass breeding. Resistance to blind-seed disease is being studied, and the Western Wolths rye-grass seed stocks are being purified by selection. H1 is a promising strain derived from a cross between perennial and Italian rye-grasses.

**White clover**

Strains with no glucosides and strains very high in glucoside content have been bred.



### Red clover

Highly productive and persistent strains have been developed from crosses between broad and Montgomery varieties.

### *Medicago glutinosa*

This crop is being improved by mass selection.

### Lupin

A white flowered mutant has occurred with a low alkaloid content.

### Flax

Fibre varieties have been crossed to Rio in order to produce rust resistant lines. Breeding for resistance to browning (*Polyspora Lini*) is also under way.

### Sugar beet

Selection work continues. There is evidence that natural crossing occurs between cultivated varieties and silver and spinach beets.

### Tobacco

Ambalema and *Nicotiana glutinosa* are being used in breeding for mosaic resistance, and Little Dutch is being used similarly for resistance to black root rot.

### Rape

B.L.E.II is a new type developed from a cross between Giant and Broad Leaf Essex varieties.

### Kale

Promising selections have been obtained from the following crosses: marrow-stem kale x thou-and-headed kale, marrow-stem kale x cabbage and marrow-stem kale x kohlrabi.

### Swedes

A deep rooted yellow-fleshed swede has been selected from the cross Grandmaster x Sensation.

### Tomato

The variety Vetomold is being further developed for resistance to a new strain of *Cladosporium fulvum* to which the old variety is susceptible.

### Peas

Selection for earliness is in progress with the progeny of the cross (Greenfeast x Greatcrop) x William Massey. It is hoped to obtain an improved Partridge variety from the offspring of the crosses Partridge x White Elephant and Partridge x Black Eyed Susan.

### Beans

Varietal differences in resistance to bacterial wilt, anthracnose and mosaic are reported.

## \*GENETICS 575.1

16. CATCHESIDE, D. G.

575.114:632.421.9

### Polarized segregation in an ascomycete.

Ann. Bot. Lond. 1944 : 8 : 119-30.

An examination of Zickler's data on the genetics of the ascomycete *Bombardia lunata* has shown that a deviation from Mendel's second law occurs. Segregation of the chromosomes bearing the two mutants *rubiginosa* and *lactea* and the normal allelomorph is not at random but is biased, the normal allelomorphs tending to pass to the upper spindle poles both at meiosis I and meiosis II. This behaviour implies that the ascus has a longitudinal gradient in respect of its differential action on the segregating chromosomes.

17. DARLINGTON, C. D.

575.17:632.8

### Heredity, development and infection.

Nature, Lond. 1944 : 154 : 164-69.

An analysis is presented of the relations existing between nuclear genes, plastid genes, plasma genes and viruses. After indicating the mode in which these factors interact in determining the development of the organism and in affecting their own activity, it is shown that they have also a mutafacient action, i.e. are able to affect each other's mutation rates. The distinction between a hereditary character and a non-hereditary character is not sharp, nor is the distinction between any of the four factors mentioned above. Such discoveries lead to a unification between genetics, the physiology of development and virus pathology.

\* General studies, see also individual crops.



18. DARLINGTON, C. D. 575.17:632.8  
**Paracrinkle virus and inheritance.**  
 Nature, Lond. 1944 : 154 : p. 489.

In reply to a recent criticism by Carson *et al.*, the author maintains that the paracrinkle virus carried by King Edward potatoes differs from other cases of symptomless carriage in that "King Edward made it".

19. HADDOW, A. 575.17:632.8  
**Transformation of cells and viruses.**  
 Nature, Lond. 1944 : 154 : 194-98.

The far-reaching implications of the recent work in the inter-relations of nuclear genes, cytoplasmic factors, viruses and the physiology of development are indicated:

20. HALDANE, J. B. S. 575.243:575.3  
**Heredity, development and infection.** 575.183  
 Nature, Lond. 1944 : 154 : p. 429.

Two observations are made on a recent paper by Darlington (cf. Abst. 17). Firstly, it is pointed out that cases are known in animal genetics where plasmagenes are transmitted from the male parent, at least, to a certain extent. And secondly, the fact that bud grafting may induce reversion of climbing roses to bush type lends some support to the discoveries reported by Lysenko and his colleagues in the U.S.S.R.

### \*CYTOLOGY 576.3

21. WILSON, G. B. and 576.312.32:581.036.5  
 BOOTHROYD, E. R.  
**Temperature-induced differential contraction in the somatic chromosomes of *Trillium erectum* L.**  
 Canad. J. Res. 1944 : 22 : Sect. C : 105-19.

Regions of reduced diameter and inferior staining capacity are found in the chromosomes of roottips of *T. erectum* L. when this plant is exposed to low temperatures. These regions are constant within the species but vary with the length of cold treatment. Low temperature does not affect the degree of contraction of differentiated regions when compared to controls or may cause less contraction; non-differentiated regions in cold treated plants are more contracted than in untreated specimens.

### \*BOTANY 58

22. THOMPSON, W. P. 581.162.5:576.356  
**The causes of hybrid sterility and incompatibility.**  
 Trans. Roy Soc. Can. 1940 : 5 (Biol. Sci.) No. 3 : p. 34.

A review of the causes underlying incompatibility and hybrid sterility is presented. The following incompatibility mechanisms are listed: (a) failure of pollen to germinate, (b) slow growth of pollen tubes in the style, (c) bursting of the pollen tubes, (d) death of the pollen tubes other than by bursting, (e) inability of the sperms to fertilize the ovum or the secondary nucleus; (f) embryonic or post-embryonic abortion, (g) failure of the endosperm to develop, and (h) abnormal endosperm development. Hybrid sterility can be attributed to (a) pre-meiotic disturbances, (b) abortion of pollen grains, (c) slow development of pollen grains, (d) failure of pollen to germinate, (e) failure of pollen tubes to reach the embryo-sac, (f) abortion of megaspores, (g) abortion of the embryo-sac, (h) aberrant development of the endosperm, and (i) embryonic abortion. The basic causes determining these effects may be genetic, chromosomal, or due to influence of the cytoplasm.

### \*DISEASES AND PESTS 632

23. PONTECORVO, G. and 632.4:575.1  
 GEMMELL, A. R.  
**Colonies of *Penicillium notatum* and other moulds as models for the study of population genetics.**  
 Nature, Lond. 1944 : 154 : 532-34.

The behaviour of mutant sectors and mixed fungal cultures when plated out on agar is described

\* General studies, see also individual crops.



and correlated with such effects as differential growth rate and competition. It is believed that such cultures may be used to demonstrate the behaviour of genes in natural populations since the interaction between the hyphal tips is analogous to the interaction of genes. An analogy to the Sewall Wright effect was found in the behaviour of mixed inocula, the initial fine sectors being replaced peripherally by a few large sectors.

24. PONTECORVO, G. and GEMMELL, A. R. 632.421.2:575.115:575.12  
**Genetic proof of heterokaryosis in *Penicillium notatum*.**  
 Nature, Lond. 1944 : 154 : 514-15.

Five mutant strains of *P. notatum* obtained by X-irradiation have been plated out in every combination of two cultures. Strains *y-1*, *w-16*, *w-2* and *w-3* when paired *inter se* produced green conidia along the contact zones although the mutants are all characterized by white or yellow conidia. All combinations involving strain 2c4, a non-conidial line, failed to produce green conidia. It is concluded from these observations that the fungus is capable of heterokaryosis and that hyphal fusions occurred between the mated strains. The mutants *y-1*, *w-16*, *w-2* and *w-3* are apparently recessive and the strain 2c4 dominant for their distinguishing characters. Conidial colour depends not on the genetical constitution of its single nucleus but on the nature of the parent mycelium. Segregation of nuclei probably occurs at sterigma formation.

25. THORNE, R. S. W. 632.422.3:582  
**Description of a top-fermentation strain of *Saccharomyces cerevisiae***  
**Hansen, catalogued as number 6479 in the national collection of type**  
**cultures.**  
 J. Inst. Brew. 1944 : 50: 222-24.

A strain of *S. cerevisiae*, named 6479, is figured and described.

26. WORSLEY, R. R. 632.951.1:581.162  
**The flowering of *Derris elliptica*.**  
 E. Afr. Agric. J. 1944 : 10 : p. 6.

The flowering of *D. elliptica* appears to be promoted by a shortage of calcium.

### ECONOMIC PLANTS 633

27. GREENWAY, P. J. 633:576.16(67.6)  
**Origins of some East African food plants. Part 1.**  
 E. Afr. Agric. J. 1944 : 10 : 34-39.

The origins of the following food plants are discussed: arrow-root, cassava, onion, garlic, Kaffir potato, potato, radish, sweet potato, taro, yam bean, yam, *Gynandropsis gynandra*, *Cleome* spp., *Moringa pterygosperma*, *Amaranthus caudatus*, *Celosia argentea*, Avocado pear and banana.

### WHEAT 633.11

28. PAL, B. P. 633.11:575(54.5)  
**The Pusa wheats: the wheat-breeding work of the Imperial Agricultural Research Institute**  
 Emp. J. Exp. Agric. 1944 : 12 : 61-73.

An account is given of the wheat breeding investigations of the Imperial Agricultural Research Institute of India. After describing some of the better known Pusa wheats, mention is made of the attempts now being made to produce wheats resistant to rust and smut. Interspecific *Triticum* crosses have been made, also crosses between *Triticum* and related genera. Cytological investigations accompany these breeding programmes.

29. CAFFREY, M. 633.11-2.452-1.521.6:575(41.5)  
**Wheat growing.**  
 J. Dep. Agric., Éire 1944 : 41 : 38-42.

Reference is made in this article to the Irish wheat breeding programme which is concerned particularly with the production of high yielding varieties resistant to yellow rust. Promising lines are being developed from Ironmaster x Pajbjerg, Atle x April Red and Atle x Ironmaster.



30. **Wheat quality and new varieties. Wheat Advisory Committee Meeting.** 633.11:664.641.016:575.12(94)

J. Dep. Agric., Vict. 1944 : 42 : 350-55.

A resolution has been passed by the Victorian Wheat Advisory Committee denying allegations that the baking quality of the wheats grown in Victoria has deteriorated.

Several new varieties are being released. Pindar Selection W603V, a selection of Pindar, is resistant to flag smut and has a higher baking quality than Ghurka. Wannon x Ghurka L6031 B5-1 is a mid-season variety with baking quality superior to that of Ghurka; Ghurka x White Fife L5266 T39-1-1 combines high yielding ability with superior flour quality; and Ghurka x Ranee M6173 T14-2-1-1 is an early variety combining the baking quality of Ranee with the agronomic characters of Ghurka.

#### OATS 633.13

31. **MILES, H. W. Frit fly on oats in the west of England.** 633.13-2.7-1.521.6

Rep. Agric. Hort. Res. Sta., Long Ashton 1943 : 119-23.

Reference is made to varietal susceptibility of oats to frit fly attack.

#### RICE 633.18

32. **KADAM, B. S. and RAMIAH, K. Bibliography on genetics of rice.** 633.18:575.1:016

Indian J. Genet. Pl. Breed. 1943 : 3 : 125-32.

A bibliography of articles on rice genetics is presented.

33. **Hsu, K.-J. and LU, H.-J. A genetical study of botanical characters in *Oryza sativa*.** 633.18:575.116.1

Indian J. Genet. Pl. Breed. 1943 : 3 : 108-14.

A gene *Hr* determines the development of hairiness on the upper surface of the leaf blades and a factor *m*, the aberrant character "combined spikelet" which is distinguished by the formation of multiple pistils, multiple anthers and additional glumes. Leaf pigmentation is determined by the interaction of the four gene pairs *Nn*, *Ss*, *Cc* and *Ii*. *Hr* and *M* are unlinked, also *C*, *N*, *S* and *M*, but *C* and *Hr* are linked.

34. **DONALD, D. A. Further notes on rice varieties.** 633.18:582:001.4(96.1)  
Agric. J. Fiji 1944 : 15 : 43-45.

A brief account is given of the nomenclature and characteristics of Fijian rice varieties.

#### LEGUMINOUS FORAGE PLANTS 633.3

35. **HILLS, K. L. The reaction of varieties of *Trifolium subterraneum* to attack by *Uromyces trifolii* as a heritable character.** 633.32-2.452-1.521.6:575.12  
J. Coun. Sci. Industr. Res. Aust. 1944 : 17 : 74-78.

Genetical studies are reported on the resistance of *T. subterraneum* to *Uromyces Trifolii*. Susceptibility appears to be dominant and is associated with late maturity. Several promising  $F_3$  lines from Mt Barker x Mulwala have been obtained, however, which combine resistance both with earliness and lateness.

#### ROOTS AND TUBERS 633.4

36. **RAMANUJAM, S. and SRINIVASACHAR, D. Cytogenetic investigations in the genus *Brassica* and the artificial synthesis of *B. juncea*.** 633.42:576.356.5:575.127.2:581.04  
Indian J. Genet. Pl. Breed. 1943 : 3 : 73-88.

A highly sterile hybrid has been obtained from the cross *B. campestris* ( $n = 10$ ) x *B. nigra* ( $n = 8$ ). When, however, it was treated with colchicine, it gave rise to a fairly fertile amphidiploid which resembled *B. juncea* and was interfertile with it. Cytological studies have also

been made with the hybrids *B. juncea* x *B. campestris*, *B. juncea* x *B. nigra*, (*B. campestris* x *B. nigra*) x *B. campestris*, (*B. campestris* x *B. nigra*) x *B. nigra* and (*B. campestris* x *B. nigra*) x *B. juncea*. A haploid sector of a haploid-diploid chimaera of *B. juncea* was examined and found to produce fewer bivalents than the hybrid of *B. campestris* x *B. nigra*; a single trivalent was also detected.

37. CHOUDHURI, H. C. 633.491:575.11:581.162.5:575.127.2  
Cytological and genetical studies in the genus *Solanum*. II. Wild and cultivated "diploid" potatoes.

Trans. Roy. Soc. Edinb. 1942-44 : 61 : 199-219.

The meiotic behaviour of the  $F_1$  hybrids of *S. simplicifolium* x *S. Rybinii* and *S. Parodii* x *S. infundibuliforme* is described; in both cases, twelve bivalents are formed in spite of morphological differences between the chromosomes of the respective sets.

Genetical studies are reported for the cross *S. simplicifolium* x *S. Rybinii*. Genes  $ll_1$  and  $ll_2$  are postulated to account for the recessive simple leaf character of *S. simplicifolium*, and  $ww_1$  and  $ww_2$  for the broad cauline wing. *S. Rybinii* has the gene complements  $LL_1 LL_2$  and  $WW_1 ww_2$ . Self-sterility of the "diploid species" is low, and extensive data are given to show that interspecific fertility may be high. Reciprocal interspecific crosses may exhibit marked differences in this respect.

38. PUSHKARNATH. 633.491:581.162:575.127.2  
Studies on sterility in potatoes. II. Abnormalities in flowering.  
Indian J. Genet. Pl. Breed. 1943 : 3 : 121-24.

An account is given of genetically determined flowering irregularities in *Solanum subtilius* Bitt., *S. Caldasii* Humb. et Bonpl. and the  $F_1$  hybrids.

39. BURTON, W. G. 633.491:581.6  
The characteristics of certain varieties of potato with special reference to their suitability for drying.  
Ann. Appl. Biol. 1944 : 31 : 89-96.

Varietal differences in potatoes are recorded in respect of cooking and drying quality.

40. HIRST, F. and ADAM, W. B. 633.491:581.6  
Potatoes for canning. Effect of soil and variety.  
Rep. Fruit Veg. Preserv. Res. Sta., Campden 1943 : 11-15.

Varietal differences in the canning quality of potatoes have been studied.

41. SAMUEL, G. 633.491-2-1.521.6:575  
Some factors affecting the yield of the potato crop.  
J.R. Soc. Arts 1944 : 92 : 562-73.

Reference is made to the need for breeding disease resistant potato varieties.

42. ELLENBY, C. 633.491-2.6-1.521.6:578.08  
Standardization of root excretions for immunity trials on the potato root eelworm.  
Nature, Lond. 1944 : 154 : 363-64.

A technique of standardizing the capacity of potato root excretions for inducing eelworm larva emergence is described.

43. CLINCH, P. E. M. 633.491-2.8:576.16:575.24:631.521.6  
Observations on a severe strain of potato virus X.  
Sci. Proc. R. Dublin Soc. 1944 : 23 : 273-99.

A description is given of a severe strain of virus X, together with an account of the reactions to it of 32 potato varieties. After a few years, however, a striking decrease in virulence occurs, attributed by the author to virus mutation. The severe strain is similar in many respects to strain  $X^N$  of Salaman, and a discussion follows on the problems connected with the identification and inter-relating of virus X strains.



44. NATH, B. and  
GOVANDE, G. K. 633.51:575.11  
**On the occurrence of the complementary gene for crumpled,  $Cp_a$ , in Rozi cotton.**

Indian J. Genet. Pl. Breed. 1943 : 3 : 133-34.

The distribution of the genes  $cp_a$  and  $cp_b$  is described with special reference to Rozi cotton.

45. IYENGAR, N. K. 633.51:576.356.5:575.127.2  
**Chromosome conjugation in pentaploid cottons.**

Indian J. Genet. Pl. Breed. 1943 : 3 : 99-107.

An account is given of the meiotic behaviour of four allopolyploid cottons. All were characterized by a high trivalent frequency.

46. RAMIAH, K. and  
NATH, B. 633.51:581.45:575.11  
**Genetics of single lobe leaf mutant in cotton.**

Indian J. Genet. Pl. Breed. 1943 : 3 : 89-98.

A recessive gene  $s$  is described which determines "single lobed" leaves. The  $F_2$  and  $F_3$  segregations occur in a ratio of 10 palmate : 1 single and it is suggested that this may be owing to differential gametic viability. There is no linkage between  $S$  and either  $Y_a$  or  $Lc_1$ .

47. RAMIAH, K. and  
PARANJPE, V. N. 633.51:581.49:575.116.1  
**The occurrence and inheritance of a new type of hairiness in Asiatic cottons.**  
Curr. Sci. 1944 : 13 : 158-60.

A new type of stellate hair with 20-30 short rays has been discovered in Viramgam lintless cotton. This feature is determined by a single gene  $H^{vi}$  which is recessive to the normal hair gene and is unassociated with the lintless gene  $ld$ .

48. HUTCHINSON, J. B. and  
STEPHENS, S. G. 633.51:582:581.9(72.98)  
**Note on the "French" or "Small-seeded" cotton grown in the West Indies in the 18th century.**  
Trop. Agriculture, Trin. 1944 : 21 : 123-25.

Evidence is presented to support the conclusion that the non-fuzzy cottons belonging to *Gossypium hirsutum* var. *marie-galante* and distributed throughout Haiti, the Grenadines, the Virgin Islands and Tobago, represent the relics of the French or Small-seeded cotton of the eighteenth century.

49. 633.523:575.11.061.6  
633.523:576.356.4

#### **Progress of technical schemes.**

Bull. Indian Cent. Jute Comm. 1944 : 7 : 172-73.

The Japanese varieties of *Corchorus capsularis* have the same three pigmentation genes as the Indian varieties. A trisomic branch has been found in a plant from Bansbari.

50. 633.523:581.45:575.242  
**Progress of technical schemes.**

Bull. Indian Cent. Jute Comm. 1944 : 7 : 130-31.

A new leaf mutant has been discovered in jute; it has fourteen diploid chromosomes.

51. 633.584.3:576.312.342  
633.584.3:576.312.35  
633.584.3:576.312.315

WILKINSON, J.

#### **The cytology of *Salix* in relation to its taxonomy.**

Ann. Bot. Lond. 1944 : 8 : 269-84.

A cytological study of the genus *Salix* is reported. The basic chromosome numbers are 19 and 22, the diploid chromosome complements of the species examined being as follows: *S. Andersoniana* Sm. 114; *S. atrocinerea* Brot., 76; *S. aurita* L., 38, 76; *S. Bockii* Seemen, 38; *S. Caprea* L., 38, 76; *S. cinerea* L., 76; *S. cordata* Muhl., 44; *S. daphnoides* Vill. 57; *S. glauca* L., 176; *S. gracilistyla* Miq., 38; *S. herbacea* L., 38; *S. hypoleuca* Seemen, 38; *S. lanata* L., 38; *S. Lapponum* L., 38, 76; *S. lasiandra* Benth., 76; *S. livida* Wahl., 44; *S. lucida* Muhl., 76; *S. magnifica* Hemsl., 38;

*S. Medemii* Boiss., 76; *S. Myrsinites* L., 38, 190; *S. pentandra* L., 76; *S. phyllcifolia* L., 88; *S. purpurea* L., 38; *S. repens* L., 38; *S. Sieboldiana* Bijdr., 76; *S. triandra* L., 38, 44, 88; and *S. viminalis* L. 38. Small but critical interspecific differences have been noted in chromosome morphology, also in nucleolar number. Both differential and neutral amphiplasty occur in  $F_1$  interspecific hybrids. These findings are believed to be of value in interpreting the phylogeny of the willows, and it is believed that they give support to the theory that the *Synandreae* are the most recent group.

## SUGAR PLANTS 633.6

52.

633.61:575(94)

### **"Trojan" and "Eros" canes.**

Aust. Sug. J. 1944 : 36 : p. 139.

Two recently developed sugar cane varieties are described. Trojan, from Co.270 x 27M.Q.1124, is a particularly vigorous cane which only lodges when the crops are very heavy. Eros, from P.O.J.2878 x 31M.Q.228, ratoons vigorously and is resistant to grub attack.

53.

COTTRELL-DORMER, W.

633.61:582(94.3)

### **Some notes on sugar cane in Tonga.**

Proc. Qd. Soc. Sug. Cane Technol. 1944 : 67-71.

A brief account is given of the sugar cane varieties of Tonga. All are noble varieties and are classified as hard types (Au) or soft (To). The principal Au varieties are Kula and Hina, and the principal To varieties, Ngata Hina, Ngata Kula, Ngata Pule Pule, Heleveka and Foufau.

54.

INNISS, B. DE L.

633.61-2.8-1.521.6:575(72.98)

### **Sugar cane mosaic disease in Jamaica and Barbados.**

Bull. B.W.I. Cent. Sugar Cane Breed. Sta., Barbados 1944 : No. 26 : 12-21.

A description is given of the varietal resistance of West Indian sugar canes to mosaic disease. The genetics of mosaic resistance is also being studied.

55.

633.682:575(67.81)

### **Annual report on the Department of Agriculture for the year ended 31st December, 1943.**

Zanzibar : Pp. 6.

This report includes a reference to the cassava breeding programme, the objective being to produce high-yielding mosaic resistant selections.

## STIMULANTS 633.7

56.

ANTILL, R. N.

633.71:575.42

### **Notes on tobacco seed selection.**

Nyasald Agric. Quart. J. 1944 : 4 : No. 3 : 18-22.

The selection criteria for tobacco are described.

57.

633.74:575(72.98)

### **Eleventh report on cacao research 1941-43.**

Imp. Coll. Trop. Agriculture, Trin. 1944 : Pp. 38.

This report includes descriptions of clonal variation in yield, flushing time, flowering behaviour, resistance to witches' broom, and resistance to cacao beetle (*Steirastoma depressum* L.).

58.

POSNETTE, A. F.

633.74:581.162.3

### **Pollination of cacao in Trinidad.**

Trop. Agriculture, Trin. 1944 : 21 : 115-18.

Cross-pollination of cacao is effected principally by *Forcipomyia* species. These insects are not responsible for pollination in *Theobroma angustifolia*, *Th. grandiflora* or *Th. baboense* which are interfertile with some cacao types. *Th. bicolor*, which is intersterile with *Th. Cacao*, is pollinated by the same insects.

59.

CHEESMAN, E. E.

633.74:582

### **Notes on the nomenclature, classification and possible relationships of cacao populations.**

Trop. Agriculture, Trin. 1944 : 21 : 144-59.

A detailed account is given of the taxonomy of cacao. All cultivated, semi-wild and wild cacaos form a single inter-breeding population which should be referred to *Theobroma Cacao* L.



At the present, it is not possible to split this species, and the binomials *Th. pentagona* Bern. and *Th. leiocarpa* should be rejected as they refer only to forms not meriting specific rank. Two sections of the species are recognized, however, the Criollo group and the Amazonian Forasteros. The term Criollo is re-defined to apply to the cacaos derived originally from Colombia, Venezuela and Central America, and two sub-divisions, the Central American and the South American, are recognized. The term Forastero with the prefix Amazonian is redefined to cover the types derived from the Amazon basin and Ecuador. Trinitario cacao is understood to apply to the very heterogeneous cacaos of Trinidad and countries which obtained their stocks therefrom; it is believed that this group arose from hybridization between the Criollos and the Amazon Forasteros. A tentative outline is suggested of the evolutionary history of the group, the centre of origin being thought to be on the eastern slopes of the equatorial Andes. It is pointed out that the term variety is inapplicable to the heterogeneous Trinitario cacaos.

60. POSNETTE, A. F. and PALMA, M. 633.74-2.472.3-1.521.6(87)  
**Observations on cacao on the Paria Peninsula, Venezuela.**  
 Trop. Agriculture, Trin. 1944 : 21 : 130-32.

The cacao stands near Yaguaraparo on the Paria Peninsula of Venezuela appear to be more resistant to witches' broom disease than the Trinidad varieties.

61. POSNETTE, A. F. 633.74-2.8-1.521.6  
**Virus diseases of cacao in Trinidad.**  
 Trop. Agriculture, Trin. 1944 : 21 : 105-06.

Clonal differences in the resistance of cacao to virus diseases are reported.

62. SALMON, E. S. 633.79:575.12(42.23)  
**Four seedlings of the Canterbury Golding.**  
 J. Inst. Brew. 1944 : 50 : 244-50.

Four new hop varieties are described, all seedlings from a cross between Canterbury Golding and a seedling raised from Brewer's Gold. Southern Brewer (WFA111) is a high yielding hop resembling the "Golding varieties" although the cones tend to assume an oblong-cylindrical shape; the cones have a silky texture and are rich in soft resins. Northern Brewer (WFB135) resembles Cobbs and Tutsham but has more "petals" in the cone; it is remarkable for its high P.V. John Ford Hop (WFA90) also resembles the "Golding varieties" but has longer cones with numerous "petals"; it too is remarkable for its high P.V. Wye Field Golding (WFC81) is intermediate between the John Ford Hop and the true "Golding varieties"; it is a prolific hop and easy to pick.

#### CONDIMENTS 633.84

63. DORASAMI, L. S. and GOPINATH, D. M. 633.842:576.354.4  
**Vine chilly—a comparative morphological and cytological study.**  
 Proc. Indian Acad. Sci. 1944 : 20 : Sect. B : 40-42.

The cytology of *Capsicum frutescens* var. *scandens* has been investigated and found to differ in no important particular from that of the typical form.

#### RUBBER PLANTS 633.91

64. 633.912:575(54.8)  
**Recommended planting material (1944).**  
 Adv. Circ. Rubb. Res. Scheme Ceylon 1944 : No. 20 : Pp. 4.  
 Five new Prang Besar clones are showing promise, viz. PB.5/63, PB.5/122, PB.5/139, PB.6/5 and PB.6/9.
65. 633.912-2.411.4-1.521.6  
**The control of bark rot and canker.**  
 Adv. Circ. Rubb. Res. Scheme, Ceylon 1944 : No. 21 : Pp. 4.  
 Clonal susceptibility of rubber to *Phytophthora* diseases is discussed.

## FRUITS 634

66. BARKER, B. T. P. 634.11:581.6  
**The production of cider fruit on bush trees. Vintage quality trials.**  
**Progress report No. 1, 1942 crop.**  
 Rep. Agric. Hort. Res. Sta., Long Ashton 1943 : 124-35.  
 An account of the vintage quality of cider apple varieties is presented.
67. 634.23:575.12(94.4)

**The "Ron's" seedling cherry.**  
 Agric. Gaz. N.S.W. 1944 : 55 : 297-98.

The variety Ron's is a new cherry derived from the pollination of Eagles Seedling by an unnamed seedling from Wallendbeen. It bears heavy clusters of fruit on short stalks and it is superior to St Margaret in quality and earliness.

68. WET, A. F. DE. 634.25:575(68)  
**The new dessert peach "Boland".**  
 Fmg S. Afr. 1944 : 19 : 381-82, 390.

The new variety Boland originated from a seedling raised at Elsenburg from a white-fleshed clingstone fruit. It crops well and is resistant to "delayed foliation"; the fruit is oblong and slightly pointed, whitish with a red striped cheek and point, and has a good flavour.

69. JACOBY, F. C. and  
 WOKES, F. 634.74:577.16:578.08  
**Carotene and lycopene in rose hips and other fruits.**  
 Biochem. J. 1944 : 38 : 279-82.

A technique for estimating carotene in the presence of lycopene is described and data are given of the content of these two substances in the hips of various *Rosa* species.

70. OLDHAM, C. H. 634.75:575(42)  
**Strawberries.**  
 Bull. Minist. Agric., Lond. 1944 : No. 95 : Pp. 67.

This bulletin is a second edition of an earlier publication. It includes an account of the history of strawberry breeding, also descriptions of the more important English varieties.

71. MASEFIELD, G. B. 634.771(67.6)  
**Some recent observations on the plantain crop in Buganda.**  
 E. Afr. Agric. J. 1944 : 10 : 12-17.

This article includes an account of Buganda plantain varieties.

## FORESTRY 634.9

72. ROPER, G. D. 634.9:575.42(42)  
**Seed selection.**  
 Quart. J. For. 1944 : 38 : 114-15.

The urgent need for seed selection in British forest trees is pointed out.

73. LAING, E. V. 634.975:581.4:582  
**Studies on the genus *Larix* with particular reference to the hybrid larch (*Larix eurolepis* A. Henry).**  
 Scot. For. J. 1944 : 58 : 6-32.

The morphology and anatomy of *L. decidua* Mill., *L. Kaempferi* Sarg. and their hybrid are described. All three forms are variable and difficulty may be experienced in distinguishing the hybrid from *L. decidua*.

## VEGETABLES 635

74. PAL, B. P. and  
 SINGH, H. B. 635.64:575.115:575.125:575.127.2  
**A note on the economic possibilities of the cross, *Lycopersicon esculentum* x *L. pimpinellifolium*.**  
 Indian J. Genet. Pl. Breed. 1943 : 3 : 115-20.

"The cross *L. esculentum* x *L. pimpinellifolium* was studied in the  $F_1$ ,  $F_2$ , and  $F_3$  generations; back-cross progenies were also studied. The  $F_1$  was earlier than the early parent and exhibited marked heterosis. In  $F_2$  and subsequent generations it was found that the small fruit size of the wild parent was partially dominant and that earliness tended to be associated with small



fruit size. A number of plants were found to possess useful combinations of characters and are regarded as promising for further breeding work. The characters for which selection has been made include earliness, a large number of clusters per plant, a large number of fruits per cluster, smooth-skinned non-cracking fruits free from green stem end, bright skin colour and good flavour". [Authors' summary.]

75. HALLSWORTH, E. G. and  
LEWIS, V. M. 635.64:577.16  
**Variation of ascorbic acid in tomatoes.**  
Nature, Lond. 1944 : 154 : 431-32.

The ascorbic acid content of tomatoes depends both on the age and size of the fruits. There is also a marked intravarietal variation in this respect. The significance of these findings for tomato breeding and the interpretation of the results obtained from induced polyploidy are discussed.

76. B. ...., A. C. 635.656:575(42.59)  
**Cambridge Multipod pea.**  
Gdnr's Chron. 1944 : 116 : p. 53.

The recently introduced Cambridge Multipod variety is described. It is characterized by bearing a bunch of pods on each peduncle, all maturing simultaneously.

77. CALDER, R. A. 635.656:575(93.1)  
**Field and garden peas. A survey of the selection and breeding work undertaken by the Agronomy Division, 1930-43.**  
N.Z. J. Sci. Tech. 1944 : 25 : Sect. A : 242-55.

Details are given of the work done on pea breeding and genetics in New Zealand between 1930 and 1943.

## Part II. Foreign.

### STATISTICS 519\*

78. ANÓS, A. 519.24  
 Estado actual de la teoría de la comprobación de hipótesis estadísticas. (**Pre-  
 sent state of the theory of testing statistical hypotheses**).  
 Bol. Inst. Invest. Agron. Madr. 1944 : No. 10 : 93-135.

A rather extensive review of some of the more modern developments is presented for the benefit of Spanish readers.

79. EPSTEIN, B. and 519.24  
 CHURCHMAN, C. W.  
**On the statistics of sensitivity data.**  
 Ann. Math. Statist. 1944 : 15 : 90-96.

Sensitivity data are taken to mean data which, in being acquired, destroy the entity. The actual case considered can be included under the heading of mortality dosage.

If  $x_i$  is the strength of the stimulus, and  $p_i$  the corresponding fraction unaffected, Bliss lays down a technique whereby the  $p_i$  represent the cumulative distribution of some known law which is transformed to a linear relation. This method has its difficulties, and the approach here follows that of Spearman, i.e. regarding  $p_i - p_{i+1}$  as the estimate of the fraction just affected at, say,  $\frac{1}{2}(x_i + x_{i+1})$ .

Taking the  $x_i$  to be integers with common difference unity, then

$$\bar{X} = \sum_1^n (p_i - p_{i+1})(x_i + x_{i+1})/2 = x_1 + \cdot 5 + \sum_2^{n-1} p_i.$$

If the total number of cases in the  $i^{\text{th}}$  sample is  $N_i$ ,  $\sigma_x^2 = \sum \sigma_{p_i}^2 = \sum \frac{p_i q_i}{N_i}$ .

The  $q^{\text{th}}$  moment is defined by  $\mu_q^1 = \sum_1^n (p_i - p_{i+1}) \times (x_1 + \frac{1}{2})^q$  and is estimated.

It is shown that it is impossible to minimize simultaneously the sampling variance of the mean and of the variance. S. N. C.

80. GRUBBS, F. E. 519.24  
**On the distribution of the radial standard deviation.**  
 Ann. Math. Statist. 1944 : 15 : 75-81.

We take  $x, y$  from a normal bivariate population. The radial standard deviation is defined to be

$Z = \sqrt{\frac{1}{N} \{ \sum (x - \bar{x})^2 + \sum (y - \bar{y})^2 \}}$ . The distributions of  $Z^2$  and of  $Z$  are found for  $\sigma_1^2 = \sigma_2^2$ , and of  $Z^2$  when  $\sigma_1^2 \neq \sigma_2^2$ , where  $\sigma_1^2$  is the variance of  $x$ , and  $\sigma_2^2$  the variance of  $y$  when the bivariate population is referred to its principal axes. In the circular case, tables of  $k$  are given such that  $P(Z \leq k\sigma \sqrt{2}) = \epsilon$  for all  $N$  from 2 to 15, and  $\epsilon$  taking values .005, .05, .95 and .995. In the non-circular case,  $P\{Z^2 \leq k^2(\sigma_1^2 + \sigma_2^2)\}$  is given as an infinite series, and is found to be a function of the ratio  $\sigma_1/\sigma_2$ , and not of the variances separately. S. N. C.

81. LEVENE, H. and 519.24  
 WOLFOWITZ, J.  
**The covariance matrix of runs up and down.**  
 Ann. Math. Statist. 1944 : 15 : 58-69.

If a random sample of  $n$  is taken in order, and the  $i^{\text{th}}$  value is  $h_i$ , we consider the sign of  $h_{i+1} - h_i$  for all  $i$ , getting an ordered sequence of signs either  $+$  or  $-$ . We call a consecutive group of similar signs "a run". The paper derives formulae for the expected values of certain functions of these runs; thus the expected number of runs is  $\frac{1}{3}(2n - 1)$ , and the expected number of runs of length  $p$  is  $2n \frac{p^2 + 3p + 1}{(p + 3)!} - 2 \frac{p^3 + 3p^2 - p - 4}{(p + 3)!}$ . Certain covariances are also considered.

It is remarked that a knowledge of the above kind can be used to test certain series of terms for randomness, but no attempt is made to lay down a procedure. S. N. C.

\* General studies, see also individual crops.



82. ROESSLER, E. B. and  
LEACH, L. D. 519.24:631.421  
**Analysis of combined data for identical replicated experiments.**  
Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 323-28.

It is shown that combined analysis of the data of field tests from several locations may indicate significant differences not apparent in the individual analyses.

83. MADOW, W. G. and  
MADOW, L. H. 519.271.3  
**On the theory of systematic sampling, I.**  
Ann. Math. Statist. 1944 : 15 : 1-24.

This paper discusses a method of sampling, other than random, from an unstratified or a stratified finite population of single elements. For an unstratified population of  $N$  elements in a given order  $N = kn$ , we divide up the elements into  $k$  classes of  $n$  elements so that the elements of any one class are equally spaced at a "distance"  $k$  apart. A sample consisting of one or more of these classes chosen at random is called a systematic sample.

Let the class means be  $\bar{x}_1, \bar{x}_2, \dots, \bar{x}_k$ , with population mean  $\bar{x}$ , then if  $k n \sigma^2 = \sum_{i=1}^n (x_i - \bar{x})^2$  and

$k n C_{kj} = \sum_{i=1}^n (x_i - \bar{x})(x_{i+kj} - \bar{x})$ , the circular definition of the serial correlation coefficient  $\rho_{kj}$  is  $\sigma^2 \rho_{kj} = C_{kj}$ .

It is shown that, from a systematic sample of  $g$  classes, (i) the mean of  $\bar{x}_1, \bar{x}_2, \dots, \bar{x}_g$  is an unbiased estimate of  $\bar{x}$ , (ii) the variance  $v$  of the above means about their grand mean is an unbiased estimate of the variance of  $x_i$  ( $i = 1, 2, \dots, k$ ) about  $\bar{x}$ , (iii)  $\left(\frac{k-g}{k-1} \cdot \frac{1}{g}\right) v = w$  is unbiased estimate of the sampling variance of the grand mean, (iv)  $v + w$  is an unbiased estimate of  $\sigma^2$ , (v) the estimate of  $\rho_{kj}$  will be biased a little, (vi) for  $g = 1$ , all the above estimates become biased except for the grand mean, and (vii) the above estimate of  $\bar{x}$  is more or less accurate than the corresponding estimate from a completely random sample according as  $\sum_j \rho_{kj} \lesseqgtr - (n-1)/2 (kn-1)$ , where

$j = 1, 2, \dots, \frac{n}{2}$  for  $n$  even, and  $j = 1, 2, \dots, \frac{n-1}{2}$  for  $n$  odd.

Two designs are mentioned for systematic sampling from a stratified population, and then some pages are devoted to a comparison of the efficiencies of systematic and random sampling for different types of population, including the case of periodic and of straight line distributions.

The use of a finite population is justified on the grounds that with trends arising in continuous production, one section of the output is not necessarily connected with another section, and is more exactly represented as a separate finite population. If  $N$  only approximately equals  $kn$ , the results will be biased to a small extent. It is emphasized that systematic sampling presupposes the significance of the order. No criteria are given for the choice of  $k$ ,  $n$  and no mention is made of what would constitute a significant departure of  $\sum_j \rho_{kj}$  from its mean value.

Such information could, if necessary, be acquired in a preliminary experiment. S. N. C.

## PHYSICS 53

84. LATARJET, R. 537.531:581.036.5:632:422.3  
537.531:581.036.5:632.3  
Action du froid sur la réparation des radio-lésions chez une levure et chez une bactérie. (**Action of cold on the reparation of lesions caused by irradiation in a yeast and a bacterium**).  
C.R. Acad. Sci. Paris 1943 : 217 : 186-88.

*Saccharomyces ellipsoideus* is able to recover from X-ray injury when incubated subsequently at a temperature of 5° C. This capacity is not present in the para-dysenteric bacillus *Y*.

85. BLESS, A. A. 537.531:633.11  
**The biological effects of X-rays as a function of intensity.**  
Proc. Nat. Acad. Sci. Wash. 1944 : 30 : 118-21.

An experiment designed to demonstrate that intensity may be a relevant factor in determining the magnitude of the biological effects due to X-irradiation was performed with the wheat variety Big Club. A negative result was obtained.

86. ROEMER. 575:633(43)  
 Aufgaben und Leistungen der deutschen Pflanzenzucht im Kriege. (**Problems and achievements of German plant-breeding in war**).  
 Mitt. Landw. 1944 : 59 : 463-64.

Plant-breeding is described in general terms and its importance for war-time production is stressed. From 1940-1943, 21 varieties of potatoes have been released, replacing an equal number of inferior kinds. They have shown an increased starch content and a higher yield as well as resistance to disease. Since 1938, 47 new varieties of cereals have been registered. The acreage under oil-producing plants has been greatly increased though the breeding of suitable varieties with increased yield, better quality, winter-hardiness and disease resistance. Thanks to the plant-breeder, Europe is now independent of imported sugar and the yield has been increased during the war.

With vegetables the aim has been to prolong the growing period so as to maintain the supply throughout the year. R. M. I.

87. STOJKOVIĆ, L. 575:633(43.7)  
 (Cereal improvement and the principles of organization of agricultural research in Czechoslovakia).  
 Arhiv Minist. Poljopr. 1939 : 6 : No. 15 : 153-60.

An outline is given of the agricultural research organization of Czechoslovakia in 1939; there were 111 research institutions, 85 state, 19 provincial and 7 private. Where private enterprises were competent to perform the breeding operations it was left to them almost entirely, as in the case of cereals; where they were not, the initiative was taken by the state, as for instance with oil bearing plants, pasture plants and tobacco. Genetical and other fundamental research was also in the hands of the state. Methods of testing were unified throughout the country, thus ensuring that the results of different stations would be comparable. A state system of seed control was introduced. According to 1937 figures there were 200 varieties of cereals, comprising 59 varieties of winter wheat, seven alternative wheats, 24 spring wheats, 23 winter rye varieties, one spring rye, three winter barleys, 53 spring barleys, 30 spring oats and three maize varieties. Of the 59 winter wheat varieties, 20 were selections from local populations, 15 selections from imported varieties, 23 hybrids between local and imported varieties and one was a wheat-rye hybrid. Nine of the spring wheats were of local origin, eight were selections from imported wheats and seven were hybrids. The situation in the other cereals was similar. Variety tests have been carried out in all parts of the country since 1921 and accurate information was therefore available regarding the suitability of any variety for any given locality. In this way a gradual diminution was being effected in the number of varieties extant.

The majority of the wheat varieties were satisfactory in yield but most of them were far from satisfactory as regards quality, standing capacity and disease resistance, and much attention was being devoted to breeding for improvement in these respects too. Alternative wheats, capable of being sown in either spring or autumn, were receiving much attention, both local and bred varieties being under observation. There were some excellent spring malting barleys but they required improvement in standing capacity and disease resistance.

The system of élite seed production and seed certification is briefly outlined.

88. 575:633(48.5)  
 633-1.521.5(48.5)  
 Förädlingsarbetets organisation och kontrollen över utsädesvarorna. Sort-  
 äkthetsskontrollen utövas av Statens Centrala Frökontrollanstalt. (**The  
 organization of breeding operations and control over seed for sale.  
 Control of authenticity is exercised by the State Central Seed Control  
 Institute**).  
 Weibulls Ill. Årsb. 1944 : 39 : 4-5.

A brief outline is given of the range of work, organization and staff, and methods of control, equipment, etc., at the Weibullsholm Plant Breeding Institute in Sweden.

\* General studies, see also individual crops.



89.

\*Ur "Arbetsplan för Weibullsholms Växtförädlingsanstalt för år 1944." (From the "Programme for Weibullsholm Plant Breeding Institute for 1944").

575:633(48.5)

Weibulls Ill. Årsb. 1944 : 39 : 35-41.

A detailed account is given of the plant material available and the work contemplated in the breeding of oats, barley, meadow and pasture plants, potatoes and root crops at the Institute in 1944.

90.

†ÅKERBERG, E.

575:633(48.5)

Aktuella resultat och förädlingsuppgifter för Västernorrlandsfilialens arbetsområde. (**Present results and breeding problems for the Västernorrland Branch Station's sphere of work**).

Sverig. Utsädesfören. Tidskr. 1944 : 54 : 91-103.

In this lecture the speaker deals with the part plant breeding can play in raising the productive capacity of the Norrland province, where it is at present lower than in most other parts of the country. Svalöf's Björn [Bear] rye has yielded 29-40% more than Förädlad Vasa II [Improved Vasa II] but attempts are being made to improve it in strength of straw and winter-hardiness. Some selections and hybrids of the local land wheat have shown improvements in yield, standing capacity and hardiness. Edda barley has yielded 10% more than Vega and improved two-row barleys suitable for milling have also been produced. In oats, Same has yielded 10% more than its closest competitor, Orion II. A promising early oat selection is Å 34/73, from the cross Orion x Sirius, which has yielded 13% more than Orion II and 6% more than Golden Rain II in a 7 year trial; it is a few days earlier than Golden Rain II and has stiffer straw; its greatest defect however is its black grain but it is thought probable that a corresponding white grained form will ultimately be produced.

Two pea selections showing superiority to Bottnia, one in earliness and one in yield, have been made from a mixed population.

Extensive regional tests of clover strains have shown how essential it is that both clover breeding and seed production should be done on a regional basis. The first product of crossing Ultuna with other clovers is an early red clover, Å 03, now undergoing trials. Improved strains of timothy and meadow fescue have also been produced.

Potatoes possessed of resistance to late blight have been obtained in crosses with South American varieties but they require further crossing before a desirable commercial potato can be produced.

91.

Lj., E.

575:633(48.5)

Utsädesföreningens extra möte under Lantbruksveckan 1944. (**The Seed Associations special meeting during the agricultural week in 1944**).

Sverig. Utsädesfören. Tidskr. 1944 : 54 : 55-62.

During 1943 the Association proceeded with its breeding programme and allied investigations on cereals including chemical and cytological studies.

The flax laboratory was destroyed by fire, but aid from official and other sources has been obtained for the creation of a research institute for problems bearing on flax processing.

Å. Åkerman's annual report on the Association contained the following points of interest:—

The work of the Association was considerably extended and a new Scanian sub-station at Ugerup was established in a markedly sandy district where specially good opportunities exist for breeding rye, potatoes, tobacco, lucerne, sweet lupin and soya beans.

New buildings have also been added to the Porsögård Estate at Luleå and in Västerbotten the establishment of a sub-station at Stendfors is contemplated and should prove a useful adjunct in breeding operations.

Carotene content in herbage plants as compared with legumes, and chemical studies of potatoes (including the relation between specific gravity and starch value) were among the subjects of investigation during the year.

\* A full translation of this paper is on file at the Bureau.

† An extended summary of this paper is on file at the Bureau.

### Cytology

Tetraploids of various crop plants are now being multiplied for use in breeding. Of fifteen tetraploid red clover plots planted out, 4 of about 1000 plants each are undergoing multiplication and also selection. Group selections of alsike and white clover have also been planted out. Tetraploid red clover and octoploid timothy have been included in the herbage experiments. Tetraploid sugar and fodder beets have shown less tendency to run to seed than diploids. Observations in tetraploid white mustard indicate that its yield is of the same order as that of the diploid form.

In a large quantity of tetraploid  $F_4$  families of flax, selected mainly for increased fertility, the fertility of the tetraploid strains averaged 2.8 seeds per capsule, but the best families had an average of 5.2 seeds per capsule.

E. Åkerberg also read a paper on breeding at the Västernorrland station (cf. Abst. 90).

### Wheat

Autumn wheat breeding aims at combining improved winter-hardiness with high yield and other economic features; and among the new hardy, high yielding strains are 01281 and 01282, selections from K01280 from the Kalmar Station which have done very well especially in the dry eastern region. The three varieties comprising the group Ög 39/510-Ög 39/515, obtained by crossing the old Bore and Sammets [Velvet] forms are promising as regards winter hardiness, high yield, early maturity and stiffness of straw. Other wheats mentioned as of interest in the same connexion are Vg. 01312 and Vg. 01340 at the Västgöta station, U. 01390, U. 01391 at Ultuna, and the Värmland variety Vrm. 01134.

A spring wheat equalling Diamant II [Diamond II] in quality and earliness but with better yield and stiffer straw is being sought and a couple of new varieties of this type are being multiplied.

### Oats

The primary aim in white oat breeding has been a variety combining the yield of Örn with good strength of straw and larger, plumper and whiter kernels; and the new white oats Sol II and 01430 represent a great advance even though not yet in the Ligowo class for grain quality.

The early white oats include Vrm. 01466 (from Seger x Gopher) which is intended as a substitute for Primus which it surpasses in yield of grain.

Black oat breeding at Ultuna has resulted in a few promising new varieties from the cross Engbrekt II x Extra-Klock [Extra-Bell]. Another variety, very early and stiff-strawed is No. 01331, Orion III.

The new oat Same is a valuable variety for northern Norrland.

### Rye

Kungs II [King's II], which almost equals autumn wheat in stiffness of straw, represents a great advance in rye breeding (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 1120). The strain 0801b has attracted attention especially by its performance on dry soils. Some material from which it is hoped to obtain a better rye than Petkus for dry soils has been transferred to the Ugerup sub-station.

### Barley

Among the 2-rowed barleys, Sv. 40/13 has yielded 6.1% more grain than Kenia, 5.5% more than Maja and 4.7% more than Freja in local and other trials, in which Bakler ranked somewhat lower than Freja.

The 6-rowed barleys from the cross Primus x Asplund have attracted special attention.

### Herbage plants

A new strain of timothy, 0812, has given very promising results at various trials.

Selection for earliness in Merkur red clover has produced a new strain nearly as early as Essi but higher yielding.

Experiments with triploid blue lucerne seem to indicate that it has the optimum chromosome number for the species and its set of seed does not seem to be inferior to that of the diploid.

Studies by the Swedish Seed Growers Union (Sveriges Fröodlareförbund) in collaboration with the State Apiculturists Union of Sweden (Sveriges Biodlares Riksförbund) on fertilization in red clover have confirmed the previous years findings as to heritable differences between strains in regard to length and breadth of the corolla tube. Strains with a long and narrow tube show poorer seed setting than others, which is attributed to the bees having greater difficulty in fertilizing the flowers.



Experiments at Svalöf are being conducted to discover how the optimum stage for harvesting red clover can be determined, and it appears that flowering does not always proceed parallel with the chemical change in the green fodder and in the hay.

### Root Crops

A new elite fodder beet Röd Kägla [Red Skittle] which grows above the soil like a swede and has given very good yields of dry matter per unit area in various trials, is undergoing multiplication. A new white green topped sugar mangel, Nova II, is also being multiplied for stock, having given very high yields of dry matter at the Svalöf and Kalmar Stations. It has a dry matter content about 1% higher than Nova and is more oval than that variety.

The Vorsta turnip J. 014 also did very well in variety trials at the Jämtland station. The General Seed Co., Ltd (Allm. Svenska Utsädesaktiebolaget) is multiplying a club root resistant line, Vg. 024, from Östersundom x Mainaepe, raised at the Västgöta Station. It is very high yielding and held its own even in soil free from infection.

### Potatoes

Among some new clones, four tested by the State Plant Protection Institute (Statens Växtskyddanstalt) proved immune to wart and as early as Early Puritan and all were quite satisfactory in quality. These varieties will be tested further. The Association should also co-operate with the Plant Protection Institute in producing as far as possible virus free élites of the varieties that the General Swedish Seed Co. releases for the market.

### Textile plants

An increase in strength of straw has been attained in textile plants and it should now be possible by heavier manuring to obtain higher yields without risk of lowering the quality by lodging. A new variety of hemp from material from Moldau seems promising.

### Oil plants

A new oil flax which gives a high yield of seed but requires a warm forcing climate has been put on the market.

Intensive breeding of oil plants has produced several new varieties. One is a new strain of Svalöf's winter rape with a higher yield and greater winter hardiness than the old varieties. Two strains of autumn turnip rape have also been produced, as well as two strains of spring rape and a new variety of white mustard obtained from an old Svalöf strain. A tetraploid white mustard is of special interest for breeding, as are also a number of early spring rapes obtained by X-irradiation.

### Legumes

A new early fodder pea 01080 (from Torsdags I x Solo) has been handed over to the General Swedish Seed Co., and a few new culinary types are being multiplied. Two new extremely early fodder peas A 05321 and A 05322, raised at the Västernorrland Station, seem useful on account of their earliness and high yields for the production of concentrates, for Norrland.

92. WEIBULL, W. 575:633(48.5)  
Till vårt lands jordbrukare och trädgårdsodlare! (To the agriculturists and horticulturists of our country).  
Weibulls III. Årsb. 1944 : 39 : 2-3.

This note on the contents of Weibull's year-book contains seed lists, the programme of work for 1944 and an announcement that the programme is in future to be submitted to the Board of the Agricultural College (Lantbrukshögskolan).

Some of Weibull's varieties and strains of root crops, put on the market, are named and an account is given of the breeding work recorded in the papers reviewed in the current issue of "Plant Breeding Abstracts".

93. WILSON, H. K. 575:633(73)  
Agronomic advances in the agriculture of the corn belt and the Great Plains regions.  
Science 1944 : 99 : 499-505.

This review includes a general account of breeding work designed for the benefit of the corn belt and Great Plains regions. The following crops are discussed: wheat, maize, oats, barley, flax, sorghum, soya beans, lucerne, sweet clover, red clover and forage grasses.

94. GILBERT, B. E. 575:633(74.5)  
**Fifty-fifth Annual Report of the Rhode Island State College Agricultural Experiment Station, Kingston, R.I. 1943 : Contr. 615 : Pp. 60.**

**Forage grasses**

*Agrostis* varieties have been selected for field performance and disease resistance. The material examined could not be classified under the specific heads usually recognized and it exhibited a wide range in cytological characters, the following chromosome numbers being mentioned: 28, 31, 33, 34, 35, 39, 40 and 42.

**Potato**

Progenies from Sebago x Erlaine and Wisconsin Pride x Erlaine have exceeded Irish Cobbler in yield and have matured earlier.

**Tomato**

Heterotic F<sub>1</sub> hybrids have been tested in the field.

95. LADD, C. E. 575:633(74.7)  
**Fifty-sixth Annual Report of Cornell University Agricultural Experiment Station 1943 : Pp. 190.**

**Wheat**

Breeding for a high vitamin B<sub>1</sub> content is in progress. Crosses have been made between commercial varieties and *Triticum Timopheevi*. One selection from a wheat x rye cross exhibits a high degree of rust resistance.

**Buckwheat**

The genetics of intervarietal crosses is being investigated.

**Oats**

The genetics of smut resistance is being studied, and a new smut resistant variety being multiplied.

**Maize**

An investigation is in progress to determine the genetical significance of the supernumerary B chromosomes. The genetics of the number of kernel rows per ear is being studied by means of reciprocal translocations.

**Barley**

Genetical studies on mildew resistance are reported and resistant strains are being developed.

**Red clover**

Breeding for high yield, disease resistance and self fertility continues and the genetics of leaf spot and mildew resistance has been studied. Tetraploid strains have been obtained by the use of colchicine.

**Bird's foot trefoil**

Promising strains are being selected.

**Potato**

Interspecific and intervarietal hybridization is reported. Breeding for blight resistance is receiving attention.

**Beans**

Strains resistant to anthracnose are being multiplied. Notes are given on varietal resistance to the two strains of bean mosaic known in the state.

96. SCHAUB, I. O. and  
BAVER, L. D. 575:633(75.6)  
**Research and farming.**  
65th Rep. N.C. Agric. Exp. Sta. 1942 : Pp. 92.

This report of the work of the North Carolina Agricultural Experiment Station includes the following items:—

**Wheat**

Three new rust resistant varieties have been developed from the cross Malakoff x Nittany.

**Oats**

Letoria has been crossed with Fulwin in order to combine the smut and rust resistance of the former with the winter-hardiness of the latter. One of the stiff-strawed selections from Lee x Bond has been out-crossed both to Lelina and Letoria in order to add the quality of smut resistance.



**Barley**

F<sub>2</sub> selections have been made of crosses between Iredell and Davidson on the one hand and Sunrise on the other. It is hoped that these new lines will be resistant both to mildew and smut.

**Forage grasses**

Striking differences have been discovered in the morphological characters exhibited by different strains of Kentucky blue-grass.

**Red clover**

A hard-seeded strain with delayed germination has been developed.

**Tobacco**

F<sub>3</sub> lines resistant to root knot have been obtained from the first generation back-cross of T.I. No. 706 on to flue-cured tobacco. A variety resistant to black-shank is being released.

**Peanut**

Almost a 100% of peanut cuttings took when treated with "Rootone".

**Rubus**

*Rubus glaucus* has been successfully crossed with North American species, including the Young dewberry, St Regis raspberry and Cumberland black raspberry.

**Blueberry**

Larger and earlier fruits are obtained by cross-pollination than by selfing.

97. COOPER, H. P. 575:633(75.7)  
**Fifty-fifth Annual Report of the South Carolina Experiment Station  
 of Clemson Agricultural College for the year ended June 30, 1942  
 (1943) : Pp. 186.**

**Cereals**

Varietal tests of wheat, oats, rye, maize and barley are reported.

**Sweet Potato**

Strains of Porto Rico differ *inter se* in sprouting capacity.

**Cotton**

Hybridization and selection continue. Several lines derived from Sea Island x Upland crosses are being stabilized.

**Paprika**

Descriptions are given of several new varieties developed from the Yugoslav material of the Carolina Paprika Mills at Dillon. Further selection is in progress. The following dominance relations have been elucidated: pendent pods are dominant to erect, spreading habit to erect, and the multilobed fruits of McInnis to the bilobed fruits of Carolina No. 7. The earliness of Carolina No. 7 is dominant in crosses with later varieties, while leaf colour and fruit shape give intermediate phenotypes on crossing.

98. COOPER, T. P. 575:633(76.9)  
**Fifty-sixth Annual Report of the Agricultural Experiment Station of  
 the University of Kentucky, 1943 : Pp. 64.**

**Forage grasses**

Kentucky blue grass is being bred for resistance to powdery mildew and *Helminthosporium* leaf spot. Ky 31 is a variety of *Festuca elatior arundinacea* characterized by wide adaptability to Kentucky conditions.

**Red clover**

Fifteen self-fertile lines have been obtained.

**Tobacco**

The disease resistant varieties Ky 41A, Ky 19 and Ky 52 are described. An aromatic Burley variety has been obtained from the cross Burley x Turkish. Breeding for combined resistance to mosaic and black root rot continues.

99. NEWSOM, I. E. 575:633(78.8)  
**Fifty-fourth Annual Report of the Colorado Agricultural Experiment  
Station 1940-41 : Pp. 61.**

#### **Barley**

Linkage studies are reported. Breeding for smut resistance is in progress and a new variety Beecher, adapted to Colorado conditions, has been released.

#### **Lucerne**

Breeding for hardiness and wilt resistance continues.

#### **Potato**

Clonal resistance to psyllids has been studied.

#### **Onions**

Breeding for resistance to purple blotch and thrips is under way.

100. BOZA BARDUCCI, T. 575:633(85)  
Memoria anual de 1941 de la Estación Experimental Agrícola de la Molina.  
(**Annual report of the Estación Experimental Agrícola de la Molina  
for 1941**).  
Lima, Peru 1941 : Pp. 112.

#### **Wheat**

Selections have been made for resistance to *Puccinia graminis Tritici*. Observations have also been made on a large collection of species, varieties and hybrids. The variety 38 M.A. x San Martín 28 has proved very promising in the coastal belt.

#### **Maize**

Observations have been made on a number of varieties and hybrids and on a cross of Amargo x Cuarentón Colorado, to find out whether resistance to sugar cane borer can be acquired from Amargo as well as resistance to locust and corn-borer.

#### **Barley**

A collection of 33 varieties is under investigation, special observations being made on resistance to fungous diseases, especially mildew (*Erysiphe graminis*).

#### **Rice**

Selected panicles have been gathered from all the varieties cultivated in the famous rice growing valley of Santa. A collection of 31 varieties is also under observation.

#### **Potato**

Tuber selection has been carried out with a number of domestic varieties with the aim of producing healthy stocks. Seedling selection has been started with *S. andigenum*.

#### **Cotton**

Increased earliness has been attained in the Tangüis progenies by selecting plants with a reduced number of vegetative branches and large numbers of fruiting branches, short internodes and low growth. From such plants a mature crop of good cotton can be obtained without risking insect damage by unduly early planting. The selection Tangüis No. 7-35 of this type has given very high yields of lint, with a length of 37 mm. as against 35.1 mm. in the control. The lint is also somewhat finer than that of ordinary Tangüis and altogether the selection is considered one of great promise. Further selections of this and other lines are under observation.

Of the thirteen selections for resistance to *Verticillium* tested, twelve proved more resistant than the standard, the best families being Nos 30-39 and 31-39. The most resistant lines obtained by selection in the field are being tested in artificially infected soil at a temperature of 22° C. The infection was much less severe in the resistant selections and took place much later, thus causing much less damage to the growth of the plants.

Promising results have been obtained from a number of hybrids between Tangüis and various Egyptian cottons.

A study has been made of interspecific crosses with *Gossypium Raimondii* and other species.

The mutant "contorta" in Tangüis has been shown to be occasioned genetically and not cytologically. The same was true for the cleistogamous mutants.

Other mutants encountered include "crinkled"; "pubescent", which shows signs of being resistant to thrips, leaf hoppers and possibly aphids; and a haploid, whose chromosome behaviour has been studied.



Chromosome studies are being made with *G. Raimondii*, *G. Thurberi*, *G. barbadense* (Tangüis), *G. arboreum* and *G. Davidsonii*. An "octoploid" Tangüis and a "tetraploid" *G. arboreum* have been obtained by colchicine treatment. Many of the treated plants of Tangüis contained extra chromosomes.

Hybrids of *G. Thurberi* x *G. Raimondii* were self-sterile but cytologically normal. *G. Harknessii* too, though sterile, was normal cytologically. An  $F_2$  plant of U4 *G. hirsutum* x *G. Raimondii* contained 21 chromosomes at metaphase II.

The insect resistance of a number of wild species is under investigation.

### Flax

Flax breeding has been begun by purifying the existing varieties, and selecting for earliness, height of plant, thickness of stem, and resistance to rust. The greatest difference in date of flowering observed was seven days, the linseed types being the latest of all.

101.

BOZA BARDUCCI, T.

575:633(85)

63.00.15(85)

Plan para centralizar la orientación técnica y el control de los trabajos de mejoramiento vegetal, por selección genética, que realizan las dependencias de la Dirección de Agricultura del Ministerio del Ramo, y para organizar semilleros oficiales u oficializados, en los principales valles de la costa y sierra del país, a fin de abastecer con semilla mejorada a los agricultores. (**Plan for centralizing the technical orientation and control of the work of plant breeding by genetical selection which is carried out by the dependencies of the Office of the Director of Agriculture of the Ministry and for organizing official or semi-official seed supplies in the main valleys of the coastal and highland region of the country with the object of supplying the cultivators with improved seed**).

An. 2a Conv. Agron. Regional, Lima, Peru 1944 : Pp. 24.

Examples are given of improvements in yield and quality of the local crops having been achieved by introduction of improved varieties from abroad, by selection from local or imported varieties, by hybridization and by artificial induction of polyploidy in wide crosses. A plan for a suitable official system of seed production and control is outlined. An outline is also given of the agricultural experimentation in Peru and of its organization, with recommendations that a system of 16 "genetical sections", or out-stations, should be established in all representative parts of the country, so that selections adapted to the conditions of every area could be produced. The respective "areas of influence" are enumerated, with indications of the crops they would take into account, the staff required and the expenditure anticipated. Five of these sections are already functioning.

## GENETICS 575.1\*

102.

SMITH, H. H.

575-18

**Recent studies on inheritance of quantitative characters in plants.**

Bot. Rev. 1944 : 10 : 349-82.

A review of recent contributions to the subject of quantitative genetics is presented. After discussing the different estimates as to the number of quantitative genes determining any one character, an account is given of the methods of analysing quantitative inheritance. The need for caution in interpreting skewed frequency distributions is emphasized. Other aspects treated include heterosis, the physiology of development, the cytological basis of quantitative genes and the effect of the cytoplasm.

103.

MALÉCOT, G.

575.1

**Mendélisme et consanguinité. (Mendelism and consanguinity).**

C.R. Acad. Sci. Paris 1942 : 215 : 313-14.

The following theorems have been derived relating to population genetics. (I). The coefficient of relationship of two individuals  $H_1$  and  $H_2$  is a half of the sum of the coefficients of relationship between  $H_2$  and the parents of  $H_1$  (granted that  $H_1$  is not an ancestor of  $H_2$ ). (II). If  $H_1$  is not an ancestor of  $H_2^\dagger$ , the coefficient of relationship between  $H_1$  and  $H_2$  is the sum of the partial

\* General studies, see also individual crops.

†  $H_1$  in the original, but presumably this is a typographic error.

coefficients through the "intermedium" of all the ancestral lines going back to  $H_1$  (each line being supposed to terminate with the first ancestor of  $H_2$  which it meets when traced backwards).

(III). The coefficient of relationship between two individuals  $H_1$  and  $H_2$  is  $f = \Sigma(\frac{1}{2})^{n+p} \frac{(1+f_A)}{2}$ , the sum  $\Sigma$  being extended to all the lines of distinct relationship connecting  $H_1$  and  $H_2$ , and each line of relationship representing the union of two ancestral lines going back from both  $H_1$  and  $H_2$  to a common ancestor A and having no common member other than A; ( $n+p$  is the number of links in the ancestral chain and  $f_A$  is the coefficient of consanguinity of A).

104. RUÍZ SANTAELLA, J. 575.1  
Métodos empleados en genética vegetal. (**Methods employed in plant genetics**).

Hojas Direcc. Gen. Agric., Madrid 1941 : 33 : No. 4 : 1-6.

A brief account is given, for the benefit of Spanish readers, of the principles of selection, hybridization, heterosis, transgressive segregation, polyploidy and mutation.

105. BURRI, R. 575.1:575.2:632.3  
Die bakterielle Dissoziation im Rahmen der allgemeinen Vererbungslehre. (**Bacterial dissociation considered in relation to the general theory of inheritance**).

Ber. Schweiz. Bot. Ges. 1943 : 53A : 277-98.

The problem is discussed from the following aspects: general principles of inheritance in Protista and higher organisms; the applicability of the concepts of phenotype and genotype to bacteria; the nature of microbic dissociation; dissociation and the variability problem; typical instances of dissociation, its causes and significance; and dissociation in the wider sense.

106. TSCHERMAK-SEYSENEGG, E. von. 575.1:633:007  
Theodor Roemer zum 60. Geburtstag. (**Theodor Roemer, on his 60th birthday**).

Z. Pflanzenz. 1943 : 25 : 187-89.

Acknowledgment is made of the debt owed by science to this German geneticist.

107. SHULL, G. H. 575.1:9  
**Genetics, the unifying science in biology.**  
Torreya 1943 : 43 : 126-31.

A brief resumé is given of historical developments in biology since the Renaissance and the thesis advanced that genetics is able to integrate the diverse tendencies that have arisen in this science with the accumulation of more specialized knowledge.

108. SINNOTT, E. W. 575.1.061.1:51:635.61/3  
**Genetics and geometry: mathematicians and biologists in studies of form.**  
Yale Sci. Mag. 1944 : 18 : No. 4.

A general account is given of the contributions made by genetics and geometry to the elucidation of morphogenetic problems. Citing his own work on fruit development in the Cucurbitaceae, the author shows how genetically determined differences in shape can be analysed in terms of the method of co-ordinate deformation, introduced into biology by D'Arcy Thompson.

109. EPHRUSSI, B. and  
SUTTON, E. 575.116.1:576.354.46  
**A reconsideration of the mechanism of position effect.**  
Proc. Nat. Acad. Sci. Wash. 1944 : 30 : 183-97.

"The hypotheses on the mechanism of position effect are critically reviewed. An interpretation is offered which regards position effect as a result of chromosome pairing that causes a modification of stress near the affected loci. Several known cases of position effect are discussed in the light of this interpretation and methods of testing it are suggested".

110. DOBZHANSKY, T. 575.125  
**Heterosis.**  
Rev. Agric. Piracicaba 1943 : 18 : 397-98.

In introducing a discussion on heterosis, the author suggested that populations may be of 3 types: (1) those in which self-fertilization is the predominant method of reproduction or the effective



population size is very low; here both recessive and dominant deleterious mutations will be eliminated and there will be little or no heterosis; (2) those with intermediate or large effective population size; here deleterious recessives will accumulate and heterosis will occur on crossing, though it will be possible to produce vigorous inbred strains; (3) those with very large effective population size; here the maximum accumulation of deleterious recessives will occur and since any one chromosome will very rarely occur in the homozygous condition, heterosis will be at a maximum and no amount of selection will produce inbred strains equal in vigour to outbred ones.

111. MÜNTZING, A. 575.148:575.12:581.162.32:633  
Nya resultat inom genetiken av intresse för växtförädlingen. (New results  
in genetics of interest for plant breeding).  
Sverig. Utsädesfören. Tidskr. 1944 : 54 : 84-90.

Confining himself to the problem of degeneration due to inbreeding and the effect of group crossing, the author points to the fundamental significance of the population analyses, conducted with *Drosophila*, for an understanding of the above two phenomena. The similarity between maize and other cross-fertilized plants from the standpoint of inbreeding is stressed as well as the desirability of applying maize breeding principles to other cross-pollinating plants. Chromosome investigations and correlated studies on fertility and vitality are of importance in elucidating the problem of inbreeding from the theoretical standpoint and perhaps also ultimately from the standpoint of the technique to be used in breeding cross-pollinated plants.

112. DOBZHANSKY, T. 575.17  
O gen como unidade auto-reprodutiva da fisiologia celular. (The gene as  
the self-reproducing unit of cell physiology).  
Rev. Agric. Piracicaba 1943 : 18 : 387-96.

This is a Portuguese translation of an address given in Piracicaba, Brazil, on 24th July, 1943. The gene's great stability, its power of reproduction and its analogy with viruses in many points of behaviour are cited amongst its more fundamental properties. As soon as a change (mutation) takes place, competition occurs and a process of natural selection, and hence of evolution, sets in.

113. PIZA, S. DE TOLEDO (JUN.) 575.17  
Em torno do gen corpuscular. (Regarding the corpuscular gene).  
Rev. Agric., São Paulo 1944 : 19 : 26-50.

Evidence is given, with citations from recent writings of many distinguished biologists, to show that the chromosome is the only body which can satisfactorily be regarded as the self-propagating unit of inheritance.

114. DOBZHANSKY, T. and SPASSKY, B. 575.22  
Genetics of natural populations. XI. Manifestation of genetic variants  
in *Drosophila pseudoobscura* in different environments.  
Genetics 1944 : 29 : 270-90.

This analysis of the natural variation of *D. pseudo-obscura* extends further the authors' investigations into population genetics. The great range in the genetical constitution of individuals forming part of a natural population is stressed, also the fact that various genotypes and potential genotypes may differ profoundly *inter se* in their reaction norms in respect of environmental conditions.

115. STADLER, L. J. 575.243:575.115:633.15  
The effects of X-rays upon dominant mutation in maize.  
Proc. Nat. Acad. Sci. Wash. 1944 : 30 : 123-28.

An attempt to induce mutation of gene *a* to *A* by means of X-rays but in the absence of the mutation inducing gene *Dt* proved unsuccessful. It was estimated that the X-ray doses applied were sufficient to induce 900,000 losses of *A* by deficiency or mutation, and that, in the presence of *Dt* in the homozygous condition, 400,000 such mutations would have been expected.

116. EMERSON, S. 575.243:632.421.9:615.37  
The induction of mutations by antibodies.  
Proc. Nat. Acad. Sci. Wash. 1944 : 30 : 179-83.

Evidence is presented to support the theory that antibodies or some other constituent of rabbit antisera produced by mycelial extracts or culture filtrates from *Neurospora crassa*, are able to induce mutations in the parent material.

117. \*LYSENKO, T. D.

575.3(47)

**(On inheritance and its changeability).**Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) Moscow 1943 :  
Nos 1-2 : 47-69; Nos 3-4 : 36-51.

A general account is given of the author's genetical theories which are now becoming generally accepted by Russian plant breeders.

The genotype is regarded as a plastic entity and capable of being altered by the "assimilation" of "nutrients". "Assimilation" is used in a much wider sense than customary and is applied to any absorption into the plant of things external to itself; the term "nutrient" is used in a correspondingly wide sense for things so absorbed.

Under optimum environmental conditions, the genotype reproduces itself unaltered, which explains the apparent examples of pure lines. When however conditions are less favourable, the genotype has to "assimilate environmental conditions which do not correspond to its nature, and organisms or individual organs are produced which differ to a greater or lesser degree from the preceding generations".

Many genotypes are "conservative", that is to say, they resist induced change, but by suitable treatments, e.g. grafting, hybridization or exposure to certain environmental conditions, this conservatism may be "shattered". Moreover, the type of change induced in the genotype is not random for "the hereditary nature of any character can be changed in the direction of the external conditions applied".

The principal evidences for these theories are outlined and it is held that both vernalization and grafting are able to alter the genotype which "assimilates", in the first case, certain phasic conditions, and, in the second, substances contained in the sap, the combination of the old genotype and the "nutrient" forming a new genotype.

Fertilization and pollination are also regarded as "assimilatory" processes, the gametes assimilating each other mutually. An account is given of loss of vigour from inbreeding and this the author explains, by an application of the concepts of the Marxian dialectic to the theory of "assimilation", as due to the absence of "vital contradiction". The "vital impulse" is believed to derive its "vital energy" from the synthesis of vital antimonies, either by mutual assimilation as in normal sexual reproduction or by the assimilation of "nutrients" that is believed to occur in grafting.

Inheritance is classified along lines suggested by Timirjazev. Heredity may be simple, when the progenies resemble the parents, or compound, when they do not. Compound heredity may again be either complex or mutually exclusive. In the first case, the properties of both parents appear in the offspring, either localized in different parts (mixed inheritance) or fused to form some intermediate condition (coalescent inheritance). Mutually exclusive inheritance covers those cases in which only one parental character is represented in the offspring and this includes two cases again, Millardet inheritance, where segregation does not occur, and Mendelian inheritance where it does. Only some of these hereditary patterns are found in sexual reproduction but all are believed to occur in the progenies of graft hybrids.

The author's references to Mendelian genetics as practised outside the U.S.S.R. are critical, and it is believed that such studies are of little practical importance. The methods of plant breeding introduced by Michurin and Lysenko have won much favour in the U.S.S.R., for it is believed that these techniques may produce a new variety in three years, while the methods of classical genetics are held to be much slower and less productive.

**ORIGIN OF SPECIES 576.1**

118. McNAIR, J. B.

576.12:581.192

**Advance in phylogenetic position in the cryptogams as indicated by their fats.**

Lloydia, Cincinnati 1943 : 6 : 155-56.

Evidence is brought forward in favour of the hypothesis that evolutionary advance in the lower plants is attended by an increase in the iodine number of their fats.

119. McNAIR, J. B.

576.12:581.192

**Energy and evolution.**

Phytologia 1941 : 2 : 33-50.

"The object of this paper is to develop the theory that species formation occurs during periods

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\* An extended summary of this paper is on file at the Bureau.



of increased inactivity, that plants which do the hardest (most difficult) work have evolved to the highest positions; that in this regard quality of products is more important than quantity; and that as morphological structures evolve from simple to complex, so plant chemical compounds evolve from simple to complex”.

120. DOBZHANSKY, T.

576.16

**The species concept.**

Rev. Agric. Piracicaba 1943 : 18 : 441–42.

It is pointed out that species existing in the same territory can be delimited with comparative ease by the existence of intrinsic barriers to interbreeding. A greater difficulty is presented by populations whose areas do not overlap, since the test of interbreeding is more difficult to apply. In organisms that reproduce by obligatory self-fertilization, parthenogenesis, or asexually, the concept of “species” developed for cross-fertilizing forms has no validity.

121. STEBBINS, G. L. (JUN.)

576.16:581.9

**The genetic approach to problems of rare and endemic species.**

Madroño 1942 : 6 : 241–58.

In this paper, an attempt is made to account for endemism by means of genetical hypotheses. Willis' concept of “Age and Area” and Fernald's concept of senescence are rejected in favour of the hypothesis that endemic species are genetically homogeneous and therefore adapted to only a narrow range of ecological conditions. Such homogeneity might arise either by “depletion” in which an originally continuous population, characterized by considerable genetical variability, becomes split up into segments, in which inbreeding and random fixation deplete the genetic heterogeneity, or by the development of insular species derived from only a few ancestral plants in which genetical heterogeneity has been absent from the start.

**CYTOLOGY 576.3\***

122. CONSTANTINESCO, D.

576.311:576.37:633.88

Sur l'évolution du chondriome du sac embryonnaire de *Digitalis purpurea* L.

(The development of the chondriome in the embryo-sac of *D. purpurea* L.).

C.R. Acad. Sci. Paris 1943 : 216 : 206–07.

An account of the behaviour of the male and female chondriomes during fertilization is presented and it is noted that none of the chondriomes of the pollen tube pass over into the fertilized ovum.

123. GRANER, E. A.

576.312.34

Estrutura dos cromosômos. (Structure of the chromosomes).

Rev. Agric. Piracicaba 1943 : 18 : 419–29.

The present state of knowledge regarding the internal structure of the chromosomes and various points on which opinions differ are outlined.

124. RASHEVSKY, N.

576.35

**Mathematical biophysics of cell division.**

Bull. Math. Biophys. 1943 : 5 : 99–102.

“A new fundamental equation  $\left[ f_i \frac{dx_i}{dt} - \tau \frac{\partial F}{\partial x_i} - \frac{\partial H}{\partial x_i} \right]$  based on the principle of maximum energy exchange, is applied to the case of elongation and constriction of a cell. A simple case is treated as an illustration, and it is shown that the elongation curves thus obtained are of the same character as in the old theory”.

125.

576.356.5

633.16:576.356.5

633.2/3:575(48.5)

BARTHEL, C.

Årsberättelse avgiven den 28 januari 1944. (Annual report made on 28

January 1944).

K. LantbrAkad. Tidskr. 1944 : 83 : 11–23.

This report of the Royal Swedish Academy of Agriculture contains the following points of interest to plant breeders and geneticists:—

Working under Professor Lundegårdh at the Physiological Institute attached to the Agricultural College, I. Ekdahl has conducted experiments to compare artificially induced and natural

\* General studies, see also individual crops.

polyploids including physiological investigations with barley and *Galeopsis pubescens*. Tetraploid barley plants were found to have a higher water, ash and sugar content than diploids, though the total nitrogen content was equal in both types of plants and so was the protein content. There are apparently no great differences in the composition of the plasma in tetraploids and diploids, but field experiments showed that great differences, which are of considerable ecological significance, exist in morphological structure. Mainly owing to the lower germination capacity and higher sterility, the tetraploids gave lower yields per unit area.

In yield experiments with polyploids it is necessary to work with whole stands and to vary the density in the stands.

At the Botanical and Genetical Institute attached to the Agricultural College, G. Turesson carried out investigations on certain grasses and other herbage plants, including the raising of seed progenies and further hybridization of blue lucerne with the extremely drought resistant Siberian yellow form (*Medicago angustifolia*). Seedling progeny of isolated and selected strains of *Triticum* [*Agropyron*] *cristatum* and *Bromus inermis* were also grown as well as progenies of *M. lupulina* with its double chromosome number and Siberian yellow lucerne. From the  $F_1$  plants of *M. angustifolia* x *M. sativa* abundant seed for large scale tests next year was obtained. The cross seems particularly promising as the erect habit, abundant seed production and extreme cold and drought resistance of the Siberian form has not been introduced before into blue lucerne by crossing.

126. KOSTOFF, D. 576.356.5  
 Polyploidie und landwirtschaftliche Produktion. (Polyploidy and agricultural production).  
 Z. Pflanzenz. 1943 : 25 : 284-304.

A full survey is given of the work that has been done in the identification and production of polyploid plant forms and its bearings on economic production. A useful table has been compiled showing world figures in 1938-39 for acreage and yields and production of protein, sugar, carbohydrates and fats by the most important economic plants with their chromosome numbers which in many cases indicate the polyploid constitution. A second table of chromosome numbers of 109 agricultural plants and forest trees is also given.

There is no doubt that polyploid forms of practical value can be obtained, but in deciding which crop plants are to be developed as polyploids, the changes induced in the plant organism by polyploidization must first be studied. The writer surveys his own results for the past twelve years in this field touching on: the differences in the chemical composition of polyploid and haploid plants; increased size of nucleus and cell associated with increased number of genomes, and consequent reduction in the frequency of cell division which is in turn connected with the length of the vegetation period (i.e. from sowing until the beginning of flowering); morphological features affected by polyploidy; the apparent tendency for chromosome doubling to produce more interesting types when the parent forms have as few and as small chromosomes as possible and the desirability of allopolyploid forms when the  $F_1$  plants show heterosis, or when they contain relatively many or large chromosomes or both.

Tetraploids flower later than diploids and octoploids still later.

Some new data are given on four tetraploids produced by the writer, viz. *Taraxacum kok-saghyz* Rodin ( $n = 8$ ), *Panicum miliaceum* L. ( $n = 18, 20$ ), *Sorghum saccharatum* Pers. ( $n = 20$ ) and *Atropa Belladonna* L. ( $n = 36$ ). By colchicine and acenaphthene treatment, *Taraxacum* tetraploids and  $2n/4n$  chimaeras were obtained. The seeds of the tetraploids were about twice as large as those of the parent diploid form and  $4n$  heads were found that contained many more seeds than the  $2n$  heads. The tetraploids also showed much more luxurious growth.

Polyploid forms of varieties and lines of *P. miliaceum* obtained by colchicine treatment were clearly distinguishable from the diploids by later flowering, greater vigour and much larger seeds; though the seeds are no fewer, empty seeds are more frequent than in the  $2n$  forms. The chromosomes of *P. miliaceum* are small and the total chromatin mass not large. Since the chromosomes are short the formation of quadrivalents in  $4n$  plants is not frequent.

*Sorghum saccharatum* also contains relatively many but small chromosomes and was therefore expected to give good  $4n$  plants. The  $4n$  forms develop later than the  $2n$  and their set of seed was lower but their sugar content higher. As regards *Atropa Belladonna* it is recommended that a big collection of ecotypes should be analysed and those with the highest content of medicinal substances, especially alkaloids, should be distributed for cultivation. In *A. Belladonna* as in *Nicotiana* species the alkaloid content can be raised by polyploidization.



In breeding it must be remembered that different genotypes react differently to polyploidization and the initial material must therefore be chosen with great care. Crossing of new polyploid forms promises good results.

The relative frequency of high polyploid numbers in nature and in cultivated forms is examined to show that the influence of polyploidy in evolution is limited and that diversity in nature must be attributed to chromosome and gene change, in which processes the polyploids show greater capacity for variation. Polyploids grow better under cultivation than under the less favourable conditions in nature.

An extensive bibliography is appended.

127. WETTSTEIN, F. V. 576.356.5:575.41  
 Warum hat der diploide Zustand bei den Organismen den grösseren Selektionswert? (**Why has the diploid condition of organisms the greater selection value?**)  
 Naturwissenschaften 1943 : 31 : 574-77.

A discussion of the biological significance of diploidy is presented. It is shown that the advantages of the diploid condition (when compared to the haploid), as far as the race is concerned, lie both in the increased chances of the formation of favourable gene combinations and also in the fact that recessive genes may accumulate.

128. DERMEN, H.,  
 SMITH, H. H. and  
 EMSWELLER, S. L. 576.356.5:581.04  
**The use of colchicine in plant breeding.**  
 Bur. Pl. Ind., Soils, Agric. Eng., Agric. Res. Admin., U.S. Dep. Agric. 1943 :  
 Pp. 6. (Mimeographed.)

A short account is given of the action of colchicine on plant tissues. Details of the techniques used in the artificial induction of polyploidy follow.

129. WITKUS, E. R. and  
 BERGER, C. A. 576.356.5:581.04  
**Veratrine, a new polyploidy inducing agent.**  
 J. Hered. 1944 : 35 : 131-33.

A 0.1% solution of veratrine sulphate in tap water has been found effective in inducing polyploidy. Chromosome doubling may occur either through complete inhibition of spindle formation, or through fusion of daughter nuclei after incomplete anaphase separation, or through the failure of anaphase separation due to sticky chromosome bridges.

130. RANDOLPH, L. F.,  
 ABBE, E. C. and  
 EINSET, J. 576.356.5:581.14:633.15  
**Comparison of shoot apex and leaf development and structure in diploid and tetraploid maize.**  
 J. Agric. Res. 1944 : 69 : 47-76.

An anatomical study has been made of the ontogeny of diploid and tetraploid maize strains. The concept of the "ideal gigas state" is developed, i.e. a state in which the volume of all cellular structures is twice that of the diploid. This ideal state is only attained in the tetraploid shoot apex, the differentiated tetraploid tissues exhibiting various deviations which may be due to the cumulative or additive effect of certain specific genes.

131. ILJINSKIĬ, A. P. 576.356.5:581.192  
**(Biochemical differences between species within polyploid series).**  
 Priroda (Nature) 1943 : No. 4 : p. 70.

The work of Pace, Hagerup, Györfy, Löve and Levan and Lozina-Lozinskaja bearing on the subject is briefly cited, mainly with reference to *Rumex* and the *Acetosella* series.

In conclusion it is stated that artificially produced polyploids will not be species or even new varieties and only natural and artificial selection and hybridization will give more or less constant populations.

132. HEYROVSKÝ, J. and HASSELBACH, H. 577.16:578.08  
 Die polarographische Carotinbestimmung. (**Polarographic determination of carotene**).  
*Z. Pflanzenz.* 1943 : 25 : 443-50.

The method of automatic electro-analysis of carotene is described in detail. For such determinations the minimum quantity of liquid required is 1 drop (.05 cc.), the ordinary concentration  $10^{-4}$  mol., and the time required for dealing with each analysis about 3 min.

## MICROSCOPIC TECHNIQUE 578.6

133. ADELHELM, E. 578.6  
**Handling extremely thin paraffin sections.**  
*Stain Technol.* 1943 : 18 : p. 144.

A technique is described for handling paraffin wax sections 2-4  $\mu$  in thickness. The microtome knife is greased and the sections floated off on the surface of water contained in a small container attached to the knife.

134. COOPER, K. W. 578.6  
**A useful accessory to the Zeiss mechanical stage for oil immersion microscopy.**  
*Stain Technol.* 1943 : 18 : 177-78.

An accessory for the stage of the Zeiss microscope is described. It enables immersion oil to be applied between the condenser and the slide without the inconveniences which the unmodified stage causes.

135. EMSWELLER, S. C. and STUART, N. W. 578.6  
**Improving smear technics by the use of enzymes.**  
*Stain Technol.* 1944 : 19 : 109-14.

Chromosome spreading in preparation of meiotic figures can be promoted by treatment of fixed tissues with the enzyme preparation "Clarase" or with the liquid media in which the following fungi have been cultured: *Aspergillus niger*, *Chaetomium globosum* and *Metarrhizium* species (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 791).

136. CONN, J. E. 578.65  
**Chlorazol black as a stain for root-tip chromosomes.**  
*Stain Technol.* 1943 : 18 : 189-92.

The following technique is recommended for staining the chromosomes of root tips: "Run paraffin sections of root tips killed in Bouin's fixative down to water; stain for approximately two hours in 1% aqueous chlorazol black E; wash in water; run up to xylene".

137. - LAW, A. G. 578.65  
**Root-tip smears following fixation with boiling water.**  
*Stain Technol.* 1943 : 18 : 117-20.

The following technique is recommended for the examination of mitotic stages in root tips. "The cells of fresh-cut root-tips are killed and fixed instantaneously by immersion in boiling water. To effect maceration, the root-tips are transferred to a mixture of 95% ethyl alcohol and concentrated HCl. The root-tips are then smeared in a drop of aceto-carmin with glass instruments. Application of mineral oil makes the preparations permanent or semi-permanent".

138. MORCE, R. 578.65  
**Control of the ferric ion concentration in iron-aceto-carmin staining.**  
*Stain Technol.* 1944 : 18 : 103-08.

By combining in different proportions a stock solution of ferric chloride in glacial acetic acid with the standard aceto-carmin reagent, it is possible to vary the ferric ion concentration in accordance with particular requirements.



139. LAKON, G. 578.65:633.1  
 Topographischer Nachweis der Keimfähigkeit der Getreidefrüchte durch Tetrazoliumsalze. ("Topographical" demonstration of the germination capacity of cereal grains by means of tetrazolium salts).  
 Ber. dtsh. bot. Ges. 1942: 60: p. 299.  
 [From Züchter 1943: 15: p. 112.]

Results obtained with tetrazolium, used as a differential stain for live embryonic tissue of cereals, agreed well with those obtained with selenium and from germination experiments. Tetrazolium is non-toxic.

## BOTANY 58\*

140. BRESLAVETZ, L. 581.04:581.162:575  
 Induced double flowers in stocks.  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1943: 40: 206-07.

Double flowering in stocks induced by the application of acenaphthene, has been transmitted to some of the progenies.

141. FAGERLIND, F. 581.163:001.4  
 Is my terminology of the apomictic phenomena of 1940 incorrect and inappropriate?  
 Hereditas, Lund 1944: 30: 590-96.

A reply to Gustafsson's criticism of the author's nomenclature of apomictic phenomena is presented (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 1160). The terms "apomixis" and "diplospory" are further explained and the term "agamogony" is altered to "apogamogony" in view of Hartmann's earlier use of the term in another sense.

142. LA COUR, L. and  
 FABERGÉ, A. C. 581.331.2:581.142:578.08  
 The use of cellophane in pollen tube technic.  
 Stain Technol. 1943: 18: p. 196.

Cellophane squares, 2 x 2 cm. in size, are recommended as a substrate for sowing pollen grains. The squares should be soaked in an appropriate nutrient solution, tried, and then floated on a drop of the solution in a petri dish.

143. CAIN, S. A. 581.9:576.16  
 Criteria for the indication of center of origin in plant geographical studies.  
 Torreya 1943: 43: 132-54.

A critique of the following thirteen criteria that have been used in the attempt to locate centres of origin is presented: (a) location of greatest differentiation of a type, (b) location of dominance of greatest abundance of individuals, (c) location of synthetic or closely related forms, (d) location of maximum size of individuals, (e) location of greatest productiveness and its relative stability in crops, (f) continuity and convergence of lines of dispersal, (g) location of least dependence upon a restricted habitat, (h) continuity and directness of individual variations or modifications radiating from the centre of origin along highways of dispersal, (i) direction indicated by geographical affinities, (j) direction indicated by the annual migration routes, in birds, (k) direction indicated by seasonal appearance, (l) increase of the number of dominant genes towards a focus, and (m) concentricity of progressive equiformal areas.

The author concludes that biogeography is suffering from a surfeit of deductive reasoning and recommends a return to inductive procedures and a reduction in the number of unverifiable hypotheses.

144. REHDER, A. 582:001.4  
 On the concept of type.  
 Torreya 1944: 44: 6-7.

A distinction is drawn between the biological and taxonomic type and the author shows, in reply to a recent criticism by Camp and Gilly, that the latter is necessary for nomenclatural stability.

\* General studies, see also individual crops.

145. BABCOCK, E. B. and JENKINS, J. A. 582:576.16  
**Chromosomes and phylogeny in *Crepis*. III. The relationships of one hundred and thirteen species.**  
 Univ. Calif. Publ. Bot. 1943 : 18 : 241-91.

In this comprehensive paper, the authors bring together the results of a cytological and taxonomic study of the genus *Crepis*, a subject which has been associated with the name of the senior author for the last 25 years. The genus is revised in the light of cytological findings and the evolutionary trends revealed thereby are described.

#### AGRICULTURE 63

146. BURTON, G. W. 631.421:633.2  
**Estimating individual forage plant yields.**  
 J. Amer. Soc. Agron. 1944 : 36 : 709-12.

A short discussion of the efficiency of visual estimations of individual plant yields is presented.

147. NÄF, A. 631.531.12(49.4)  
 633:575.42(49.4)  
**Die Entwicklung des Saatzuchtwesens in der Schweiz und seine Bedeutung für den inländischen Getreidebau. (The development of the seed production organization in Switzerland and its importance for home cereal cultivation).**  
 Ber. Schweiz. Bot. Ges. 1943 : 53A : 44-61.

This article deals with the history and development of seed production and control in Switzerland. The second section treats of cereal breeding in the form of early selection work on land varieties, description of varieties, prevention of deterioration of selected strains, comparative trials and choice of varieties, the formation of the Seed Production Societies (Saatzuchtgenossenschaften) after 1918, the importance acquired by milling and baking quality, field inspection and disease control and seed certification.

Economic aspects are also considered.

#### PLANT DISEASES AND PESTS 632\*

148. STEVENSON, J. A. 632:582:001.4  
**A preliminary list of authors of plant parasites with recommended abbreviations.**  
 Plant Dis. Reporter 1944 : 28 : 366-95.

A list of recommended abbreviations for the citation of authors of plant pathogens has been compiled.

149. RUDORF, W. 632-1.521.6:575:633  
**Resistenzzüchtung, ihre Grundlagen und Methoden. (Breeding for resistance, its basic principles and methods).**  
 Z. Pflanzenz. 1943 : 25 : 190-208.

This critical survey of the work that has been done on the above subject in Germany and other countries deals with the following aspects: the basis of breeding for resistance to fungous pests, bacterial diseases and viruses; and genetical methods of breeding for resistance. The bibliography of relevant literature contains 67 references.

150. STEINBERG, R. A. 632.4:575.243  
**Variants in fungi: formation, reversion and prevention.**  
 Science 1944 : 100 : p. 10.

The technique of culturing in media high in amino-acids is recommended for effecting a reversion of variant fungal strains to the normal type.

151. MUJICA R., F. 632.4-1.521.6:633:575  
**Inmunización mediante la formación genética de variedades resistentes a las enfermedades de las plantas. (Immunization by means of the genetical production of varieties resistant to plant diseases).**  
 Bol. Sanid Veg., Chile 1943 : 3 : 15-30.

A somewhat full account is given of the questions of physiological races of pathogenic fungi, the inheritance of resistance and the different types of resistance.

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\* General studies, see also individual crops.



152. BEADLE, G. W. and COONRADT, V. L. 632.421.9:575.125:575.115  
**Heterocaryosis in *Neurospora crassa*.**  
 Genetics 1944 : 29 : 291-308.

Successful attempts have been made to obtain lines of *N. crassa* heterocaryotic for various mutant characters. By utilizing strains unable to synthesize specific biochemical substances it has been possible to demonstrate heterocaryosis and to separate the component strains. The ratio of nuclei in the heterocaryon may vary and the interaction between them gives rise to dominance relations analogous to those of diploid organisms.

It should be possible to obtain mycelia heterocaryotic for more than two nuclei.

Heterocaryotic vigour is believed to resemble heterotic vigour in its physiological basis. The inter-relation of heterocaryosis and natural selection and its significance in the evolution of sex is considered.

153. SRB, A. M. and HOROWITZ, N. H. 632.421.9:581.192:575.11  
**The ornithine cycle in *Neurospora* and its genetic control.**  
 J. Biol. Chem. 1944 : 154 : 129-39.

Seven different strains of *N. crassa* are described which lack the capacity for synthesizing arginine. In each case, this lack of synthetic capacity is inherited monomerically. Some of the mutants can utilize ornithine, citrulline or arginine, some citrulline or arginine, and one arginine alone. It is concluded that an ornithine cycle is present in *N. crassa*, similar to the system described by Krebs and Heuseleit for the mammalian liver. Each step in the cycle is believed to be governed by the action of particular single genes.

154. REGNERY, D. C. 632.421.9:581.192:575.116.1  
**A leucineless mutant strain of *Neurospora crassa*.**  
 J. Biol. Chem. 1944 : 154 : 151-60.

A mutant of *N. crassa* is described which lacks the capacity for synthesizing leucine. The single gene determining this character is linked to the morphological character 5801.

155. REBOUL, J. 632.422.3:537.531:581.143.26  
**Nouvelles expériences sur l'action des rayons sur les levures. (New experiments on the action of X-rays on yeasts).**  
 C.R. Acad. Sci. Paris 1942 : 215 : 261-63.

The lethal effect of X-rays on yeast (*Saccharomyces ellipsoideus*) has been investigated. Prolonged irradiation was found to result in a 45% survival of the yeast individuals. This result is interpreted as a consequence of differential growth rates in the cultures.

156. MARCILLA ARRAZOLA, J. and FEDUCHY MARIÑO, E. 632.422.3:581.6  
**Contribución al estudio de una levadura perteneciente al género *Saccharomyces*, capaz de fermentar mostos de uva fuertemente sulfitados (mostos azufrados) sin previa desulfitación. (Contribution to the study of a yeast belonging to the genus *Saccharomyces*, capable of fermenting sulphurous grape must without previous removal of SO<sub>2</sub>).**  
 Bol. Inst. Invest. Agron. Madr. 1944 : No. 10 : 293-96.

In continuation of the earlier report (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 490) it is now stated that the race in question corresponds more closely to *Saccharomyces bisporus* Castelli than to *S. Ludwigii* or *S. Behrensianus*; it is not identical, however, producing for instance abundant asci, and is therefore classed as a new species *S. Mestris*.

157. STEVENSON, J. A. and JOHNSON, A. G. 632.451:582:001.4  
**The nomenclature of the cereal smut fungi.**  
 Plant Dis. Reporter 1944 : 28 : 663-70.

The following nomenclatural changes for cereal smut fungi are necessitated by the strict application of the International Rules of Botanical Nomenclature: *Sphacelotheca destruens* (Schlecht.) Stevenson et A. G. Johnson, not *S. Panici-miliacei* (Pers.) Bub.; *Tilletia caries* (DC.) Tul. not *T. Tritici* (Bjerk.) Wint.; *T. foetida* (Wallr.) Liro, not *T. foetens* (Berk. et Curt.) or *T. laevis* Kuehn; *Ustilago Avenae* (Pers.) Rostr. not *U. Avenae* (Pers.) Jens.; *U. Hordei* (Pers.) Lagerh. not *U. Hordei* (Pers.) Kell. et Swing.; *U. Kolleri* Wille, not *U. levis* (Kell. et Swing.) Magn.; *U. Maydis* (DC.) Cda not *U. Zeae* (Beckm.) Ung.; and *U. nuda* (Jens.) Rostr. not *U. nuda* (Jens.) Kell. et Swing.

158. HOLTON, C. S. 632.451.3:575.115:575.127.2  
**Inheritance of chlamydospore and sorus characters in species and race hybrids of *Tilletia caries* and *T. foetida*.**  
 Phytopathology 1944 : 34 : 586-92.

Observations have been made on the mode of inheritance of chlamydospore and sorus characters in interspecific and intraspecific crosses of *T. caries* (DC.) Tul. and *T. foetida* (Wallr.) Liro. In some hybrids, smooth spores were dominant to reticulate but in other cases, the reticulate character was partially dominant.

159. BLACK, L. M. 632.8:576.16:633.491  
**Some viruses transmitted by Agallian leafhoppers.**  
 Proc. Amer. Phil. Soc. 1944 : 88 : 132-44.

An instance of physiological specialization of a virus to its insect vectors is described for the potato yellow-dwarf virus. The New York strain is transmitted by *Aceratagallia sanguinolenta* but not by *Agallia constricta* while the reverse relationship holds for the New Jersey strain. There does not appear to be a corresponding specialization in the relationship between the virus and its host plants.

160. DRAIN, B. D.,  
 SIMANTON, W. A. and  
 MILLER, A. C. 632.951.1:581.6  
**Studies on clonal strains of pyrethrum.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 521-24.

Significant clonal differences in the pyrethrin content of pyrethrum are described.

#### ECONOMIC PLANTS 633

161. RUSSELL, P. G. 633:001.4(7 + 8)  
**Names of crop plants used in the Americas.**  
 Div. Pl. Explor. Intro. Bur. Pl. Ind., Soils, Agric. Eng., U.S. Dep. Agric.  
 1943 : Pp. 29.

A list of vernacular crop-plant names current in the Americas has been drawn up. English and Latin equivalents are given. Indian dialect words are not included unless they are adopted widely.

162. ADAMS, G. and  
 SMITH, S. L. 633:577.16(79.7)  
**Experiment station research on the vitamin content and the preservation of foods.**  
 Misc. Publ. U.S. Dep. Agric. 1944 : No. 536 : Pp. 88.

The vitamin contents of many economic crops and of their varieties are given, also an account of the effect of environmental factors on these values.

163. KELLY, W. C. and  
 SMITH, O. 633:581.6  
**Specific gravity determination as an aid in research.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 329-33.

The value of specific gravity determinations in the assessment of the quality of horticultural products is indicated.

164. VINCENT, C. L. 633-1.521.6:581.04  
**Vegetable and small fruit growing in toxic ex-orchard soils of central Washington.**  
 Bull. Wash. Agric. Exp. Sta. 1944 : No. 437 : Pp. 31.

Varietal resistance to soil arsenic derived from spraying residues is described for asparagus, potatoes, tomatoes, tobacco, dewberries, raspberries, grapes, beet, squash, sweet corn and strawberries.

165. AAMODT, O. S. 633-1.8:575  
**Breeding crops for production at high fertility levels.**  
 J. Amer. Soc. Agron. 1943 : 35 : 173-74.

The importance of breeding crop varieties adapted to a high soil nitrogen value is indicated.



166. REED, G. M. 633-2:576.16:631.521.6:575

**Phytopathology—1867-1942.**

Torrey 1943 : 43 : 155-69; also Contr. Brooklyn Bot. Gdn 1943 : No. 99.

This historical review includes brief references to the subjects of physiological specialization and the development of disease resistant varieties.

**CEREALS 633.1**

167. FRÖIER, K. and GUSTAFSSON, Å. 633.1:537.531

**The influence of seed size and hulls on X-ray susceptibility in cereals.**

Hereditas, Lund 1944 : 30 : 583-89.

It is shown that, in general, small embryos are more susceptible to X-ray effects than large, and that naked grains are more susceptible than hulled.

168. WAHLEN, F. T. 633.1:575(49.4)

**Wandlungen und Ziele des schweizerischen Pflanzenbaues. (Changed trends and aims of plant cultivation in Switzerland).**

Ber. Schweiz. Bot. Ges. 1943 : 53A : 21-43.

The remarkable suitability of the Canadian wheat Huron to cultivation in the most varied conditions in Switzerland is stressed as showing how breeding or the importation of foreign varieties can raise production.

Rye breeding for quality should not be carried on without due regard to the importance of high yield and resistance to lodging and reliability of yield. Spelt breeding also offers many possibilities, as its limit of improvement has not yet been reached. The Zürich-Oerlikon Versuchsanstalt (Research Station) may undertake this task in view of Wagner's recent work there.

Vegetable breeding has also received a new impetus from war conditions.

169. PELSHENKE, P. 633.1:575:664.641.016

Ziele, Methoden und Erfolge der Qualitätszüchtung bei Weizen und Roggen.

**(Aims, methods and achievements of breeding wheat and rye for quality).**

Z. Pflanzenz. 1943 : 25 : 343-61.

The importance of cereal breeding for quality, appropriate methods, and the milling and baking properties upon which it is based are reviewed individually with illustrations from the work that has been done in Germany and other countries. The three main aims of the breeder should be: improved gluten quality, freedom from the tendency to germination in the ear and high gluten content.

The varieties Tassilo, Hauter II and the new varieties Firlbeck AC 1 and Walthari, bred by Scharnagel at Weihenstephan, are among the successes in quality wheat breeding in Germany. These productions were intended for Bavaria. Other good varieties, intended for the North German area, are (1) Heines Koga (from a Heines Kolben x Garnet cross), noted for its yield, wide range and superior quality, and (2) Rimpaus Langensteiner spring wheat.

The origin and importance of Red Fife in British wheat breeding are indicated in a critical survey of wheat production in various countries including Russia.

The properties upon which quality in rye is based are more briefly treated.

The need for co-operation between the botanist, biologist, chemist, geneticist, plant breeder and other technical workers in rye improvement is emphasized.

170. MOORMANN, B. 633.1:581.142

**Untersuchungen über Keimruhe bei Hafer und Gerste. (Investigations on dormancy in oats and barley).**

Kühn-Arch. 1942 : 56 : p. 41.

[From Züchter 1943 : 15 : p. 112].

The influence of temperature, chemical substances, the embryo and the structure of the seed coat was examined. Dormancy is genetically conditioned by two independent groups of genes, one determining the structure of the seed coat, and the other, the character of the embryo. In the segregation from hybrid progenies the first group is always one generation behind the second, since the testa is purely maternal in origin.

Many varieties of oats from the most varied areas of cultivation are suitable as parents in breeding for freedom from germination in the ear.

171. \*PISAREV, V. E.

633.1-1.557:575

**(Plant breeding for high yields).**

Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoj Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 : No. 10 : 3-34.

The yield of a crop is not a simple character which can with certainty be transmitted from one generation of plants to another during the process of hybridization. As regards cereals, the yield  $X$  can be resolved into the following elements:  $A$  = the number of plants harvested per unit area,  $B$  = the number of bearing shoots per plant,  $C$  = the weight of a single grain,  $D$  = the number of grains per spikelet,  $E$  = the number of spikelets per spike or panicle; the yield can be expressed therefore by means of the formula  $X = (A \times B) \times (C \times D \times E)$ .

The average yield of two varieties may be the same, but the factors enumerated above which preponderate in one variety may be insignificant in the other. One variety may maintain its yield because of the vigour which enables all but a few of the plants to survive until harvest; the other, though perhaps standing less densely, may have either more or heavier grains in its spikes than the first. Furthermore, the conditions of soil, climate, and other factors prevalent in a particular region may favour some of the constituent elements of yield, but not the others; therefore the breeder, in making his choice of parental plants, must choose those which can transmit to their progeny the particular combination of elements which, more than any other, will enable the progeny to yield abundantly under the conditions in which they are to be grown.

This method of analysing the yield can be applied not only to cereals but, with appropriate modification, to legumes, flax, and other kinds of crop also.

In view of the uncertainty which accompanies all attempts to combine in one cereal hybrid the characters, say, of both earliness and abundant yielding, the method of breeding recommended in the present article consists in crossing varieties which are both early; a large yield from either is not a primary consideration, though the largest which is available, the primary requirements having been satisfied, is, naturally, preferred. It is necessary, however, that the combination of elements in the two parents chosen should be in marked contrast to one another. I. Z.

**WHEAT 633.11**

172. DE GRADO, A.

633.11:575(46)

Ensayos comparativos de variedades de trigos; selección por líneas puras y estudios relativos a diferentes formas de siembra. **(Comparative tests of wheat varieties; pure line selection and relative studies under different sowing conditions).**

Bol. Inst. Invest. Agron. Madr. 1944 : No. 10 : 273-92.

Comparative tests have been made on 12 wheat varieties selected for yield, earliness and rust resistance, 6 of the hard and 6 of the soft type. The former have given higher yields than the latter, Granja de Badajoz, Senatore Capelli and Rubio de Belalcázar being the best over the four-year period of the test; Senatore Capelli was not quite so early as the other two. Among the soft group Monte de Leciñena was distinguished by its yield and earliness but showed a tendency to lodge; it is mixed however and is thought to be susceptible of improvement in standing capacity through pure line selection. The variety Tremés, which has so far only been tested for one year, seems to be the best for spring sowing. Mentana was the earliest in winter sowings.

Most of the varieties under observation are mixed populations and pure line selection has been started with Granja de Badajoz, Rubio de Olivenza, Coruche, Piche, Monte de Leciñena and Tremés. Observations have been made on rust resistance, height of plant, time of ear emergence and maturity, lodging, tillering, ear density, and aspect, texture and yield of grain. The two best lines of each variety have been selected and their characteristics are presented in tabular form. Different varieties were found to react differently to variations in density and type of sowing.

173. ÅKERMAN, Å.

633.11:575(48.5)

Svalöfs Skandiavete III. Nytt Skandiavete med bättre vinterhårdighet än hos Skandia II. **(Svalöfs Skandia wheat III. A new Skandia wheat with better winter-hardiness than Skandia II).**

Sverig. Utsädesfören. Tidskr. 1944 : 54 : 63-65.

An analysis of the performance of the new wheat, line 01091 [a selection from the first élites

\*An extended summary of this paper is on file at the Bureau.



from Skandia (01090a)] in trials in different parts of Sweden showed its superior winter-hardiness. Its straw is very stiff, its grain large and plump and its yield appears good, though further trials are needed to define its exact position.

174. BERG, S. O. 633.11:575(48.5)  
Nya resultat av veteförädlingen vid Weibullsholm. (New results of wheat  
breeding at Weibullsholm).  
Weibulls Ill. Årsb. 1944 : 39 : 22-23.

The severity of the winters of 1940-42 provided an opportunity for selecting hardy strains. Some Finnish wheats and hybrids with those that proved the most hardy are being used in further breeding. But some hybrid lines derived from Swedish varieties too have shown remarkable over-wintering capacity, e.g. Ergo x Svea II, designated Weibull's 8739, which has been tested in trials since 1939 and has now received the name of Weibull's Virtus. It is claimed that this wheat is superior in hardiness not only to its parents but also to all other bred wheats on the Swedish market. Experiments in 1939 and 1943 seem to indicate that Virtus also probably equals Ergo in yield of grain.

A new spring wheat Weibull's Bronsvete (Bronze wheat), which will be put on the market in 1945, has been obtained from a cross Aurore x Extra Kolben II and has undergone tests from 1935 to 1943 under the name Weibull 8882. It surpasses Extra Kolben II, Atle, Diamant II and Fylgia in yield of grain and has equalled Progress spring wheat in average yield. It ripens earlier than Progress, and has relatively short straw stiffer than Diamant II and Fylgia though not so stiff as Atle and Progress. In baking quality it equals Extra Kolben II. It is recommended for certain districts in Götaland.

175. CLARK, J. A. 633.11:575(73)  
Registration of improved wheat varieties, XVI.  
J. Amer. Soc. Agron. 1944 : 36 : 447-52.

Four new varieties were approved for registration in 1943. Fairfield, from Purkof x Fulhio, is a soft red winter wheat resistant to winter killing, loose smut and mosaic. Carleton, obtained by back-crossing Vernal to Mindum, is an emmer wheat characterized by superior stem rust resistance and straw strength. Stewart, a product of the same back-crossing programme that produced Carleton, resembles that variety in rust resistance but yields better; it is inferior in respect of straw strength. Newthatch, obtained by back-crossing Thatcher x Hope to Thatcher, resembles the latter in most characters but yields better and is more resistant to leaf and stem rusts.

176. WALDRON, L. R. 633.11:575(78.4)  
The new Mida wheat variety.  
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1944 : 6 : No. 4 : p. 9.

The new variety Mida resembles Rival but has superior rust resistance, straw strength, and resistance to shattering.

177. CHIN, K.-C. 633.11:575.11:575.127.2  
633.11-2.45-1.521.6:575.127.2  
Modification des grains dans l'hybride de blé *monococcum* x *vulgare*. (Grain  
modification in the wheat hybrid *monococcum* x *vulgare*).  
C.R. Acad. Sci. Paris 1942 : 215 : 305-06.

The progeny of the cross *Triticum monococcum* var. *vulgare* x *T. vulgare* var. Hybride de la Paix [Hybrid of Peace] has been studied with special reference to the types of grain segregated. The hybrid is important on account of its rust resistance, which it derived from *T. monococcum*.

178. PAO, W. K.,  
LI, C. H.,  
CHEN, C. W. and  
LI, H. W. 633.11:575.11-181.13  
Inheritance of dwarfness in common wheat.  
J. Amer. Soc. Agron. 1944 : 36 : 417-28.

The expression of dwarfness in wheat is brought about by the interaction of three dominant genes  $D_1$ ,  $D_2$  and  $D_3$ , any of which may be replaced by the duplicate factors  $D_1'$ ,  $D_2'$  and  $D_3'$  respectively. If any of these genes are replaced by the recessive allelomorph, normal plants are developed. The gene  $I$  acts as an inhibitor to the expression of dwarfness, normal plants again being developed (cf. Abst. 179).

179. PAO, W. K.,  
LI, C. H.,  
CHING, T. W. and  
LI, H. W. 633.11:575.11-181.13  
(Studies on the inheritance of dwarfness in common wheat).  
Chinese J. Sci. Agric. 1943 : 1 : 1-12.

The mode of inheritance of dwarfing in wheat has been examined and it is concluded that seven genes are involved, viz.  $D_1$ ,  $D_2$ , and  $D_3$ , the duplicate factors  $D_1'$ ,  $D_2'$  and  $D_3'$ , and an inhibitor  $I$ . Dwarfness is only expressed in the gene combination  $D_1 D_2 D_3 i$ , the dominant complementary genes being able to replace for the corresponding  $D$  genes. Segregation ratios for several intervarietal crosses are given and the following genetic constitutions for the varieties are propounded: Quality,  $D_1 d_3 D_3 D_1' d_2' d_3' i$ ; P165,  $d_1 D_2 D_3 d_1' d_2' d_3' I$ ; 25V112-1,  $D_1 d_2 d_3 d_1 d_2 d_3 i$ ; 25V112-2,  $D_1 d_2 d_3 D_1' d_3' d_3' i$ ; 2905,  $d_1 d_2 d_3 d_1' d_2' d_3' i$ ; Mo's 101,  $d_1 D_2 d_3 d_1' d_2' D_3' I$ ; Noogar Fawn and Florence,  $D_1 D_2 D_3 d_1' d_2' d_3' I$ ; Majestic and Marshall's No. 3,  $D_1$  (or  $d_1$ )  $D_2 D_3$  (or  $d_3$ )  $D_1' d_2' D_3' I$ ; Onas,  $D_1$  (or  $d_1$ )  $d_2 D_3 D_1' D_2' D_3'$  (or  $d_3'$ )  $I$ . Purple straw, Rajah and Omaral,  $D_1$  (or  $d_1$ )  $D_2 D_3 D_1' d_2' D_3'$  (or  $d_3'$ )  $I$ ; 7L1 and 6L1,  $d_1 d_2 d_3 D_1' d_2' D_3' i$ ; Kyana-Toa-Mei,  $d_1 d_2 D_3$  (or  $d_3$ )  $d_1' d_2' D_3'$  (or  $d_3'$ )  $I$ ; and Pei-Teng-Mai,  $d_1 d_2 d_3 d_1' D_2' d_3 I$ .

180. 633.11:575.127.2  
Giant grained hybrid wheat.  
Sth. Seedsman 1944 : 7 : No. 8 : p. 53.

A reference is made to the large grained wheat hybrids produced by Zhebrak from the cross *Triticum durum* x *T. Timopheevi* (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 1072).

181. 633.11:575.127.5:633.289:575.129  
Amphidiploids of wheat and *Agropyron*.  
J. Hered. 1944 : 35 : p. 128.

Brief reference is made to the Russian and Canadian work on *Triticum* x *Agropyron* amphidiploids.

182. CHIN, T. C. 633.11:576.312.32:575.127  
(Cytology of wheat and its application).  
Chinese J. Agric. Sci. 1943 : 1 : 66-92.

A general account of wheat cytology, including reference to interspecific and intergeneric hybrids is presented for the benefit of Chinese readers.

183. KIHARA, H. 633.11:576.356.4  
(Polyploidy of wheat).  
Bot. and Zool. 1939 : 7 : 211-18.

Plants of *Triticum Spelta* have been obtained deficient for each of four out of the seven chromosome pairs of the D genome. These 40-chromosome plants are dwarfs but derivative large plants have been obtained by a reversion to the original chromosome number brought about by the duplication of chromosomes of the A or B genomes. By hybridizing such plants, it is possible to replace up to 4 of the D genome chromosomes by members of the A or B sets.

184. SEARS, E. R. 633.11:576.356.4:575.11  
Cytogenetic studies with polyploid species of wheat. II. Additional chromosomal aberrations in *Triticum vulgare*.  
Genetics 1944 : 29 : 232-46.

Seventeen of the twenty-one possible nullisomics of *T. vulgare* var. Chinese Spring have been obtained, eleven deficient for chromosomes homologous to those of the tetraploid wheats, and six for the non-homologous chromosomes. The following factors have been located by a study of the nullisomic phenotypes: a factor for red seed, the hooded factor *Hd*, the awn suppressor factor  $B_2$ , two factors for awn growth, the speltoid chromosome with factors for pubescent nodes, square-headedness and suppressed awns, and the factor  $b_1$  whose dominant allele inhibits awning. The mode of inheritance of nullisomic, monosomic, trisomic and tetrasomic configurations is treated. Telocentric chromosomes and isochromosomes occur frequently in the offspring of the monosomics.

185. PAO, W. K. and  
LI, H. W. 633.11:576.356.5:575.114  
(On the inheritance of pentaploid wheat hybrids, a critique).  
Chinese J. Agric. Sci. 1943 : 1 : 23-32.

A mathematical analysis of the behaviour of the meiotic chromosomes of pentaploid wheats as



reported by Kihara and Matsumura is presented. Segregation of univalents of the D genome is not at random but is influenced by the homogeneous residual attraction between the univalents. This non-random segregation, together with univalent elimination, differential pollen competition and possibly the effect of unbalanced gametes, contribute to the aberrant genetical behaviour of these plants.

186. CHRISTIANSEN-WENIGER, F. 633.11:581.14:575  
 Ablauf und Modifizierbarkeit des Entwicklungsrhythmus bei Weizen. (**Course and modifiability of the development rhythm in wheat**).  
 Z. Pflanzenz. 1943 : 25 : 305-42.

One of the plant breeder's tasks is to produce varieties with a developmental rhythm suited to different conditions of locality and climate. It is therefore necessary to extend the study of the developmental rhythm in cereals and to examine all its phases in detail. The present paper records observations of this kind made on thirteen wheats (including some Turkish and Canadian varieties), grown in different places and different years to test varietal adaptation and the modifiability of the developmental rhythm in wheat. The method and localities used for the tests are described in full, special stress being laid on leaf surface because of its importance as a factor affecting developmental rhythm.

The five phases of development in the grasses are analysed and the results of the author's tillering and earing studies are given, showing the occurrence of varietal differences that could be used by the breeder.

Developmental rhythm showed considerable constancy in the different varieties though it can evidently be modified by environmental conditions.

The importance for the breeder studying parental forms carefully from the standpoint of developmental rhythm is stressed.

Relevant work by other investigators is discussed.

187. MEREDITH, W. O. S.,  
 EVA, W. J. and  
 ANDERSON, J. A. 633.11:581.6  
**Effect of variety and environment on some qualities of malted wheat flour.**  
 Cereal Chem. 1944 : 21 : 233-40.

Varietal differences in the malting quality and  $\alpha$ -amylase activity of wheat are reported.

188. WORZELLA, W. W. 633.11-1.8.  
**Response of wheat varieties to different levels of soil productivity:**  
**I. Grain yield and total weight.**  
 J. Amer. Soc. Agron. 1943 : 35 : 114-24.

Varietal differences in grain yield and total weight have been examined at three soil fertility levels. Significant interactions occur between varietal response and fertility level but these are held to be insufficiently large to change the yield ranks at each fertility level.

189. VOGEL, O. A.,  
 CLASSEN, C. E. and  
 GAINES, E. F. 633.11-2.451.3:576.16:631.521.6:575.11  
**The inheritance of reaction of Turkey-Florence-1 x Oro-1 to race 11 of *Tilletia tritici*.**  
 J. Amer. Soc. Agron. 1944 : 36 : 473-79.

Inheritance studies of the progenies of the cross Turkey-Florence-1 x Oro-1 have shown the existence of three factors for resistance to race 11 of *T. Tritici*. C and D are major dominant factors for resistance and E is a minor resistance factor; Oro-1 has the constitution *CCDDee* and Turkey-Florence-1 the genotype *ccddEE*. The presence of race T-13 in the T-11 inoculum is held not to modify the T-11 reaction to any noticeable extent.

190. \*PISAREV, V. E. and  
 MALINOVSKAJA, E. S. 633.11-2.484-1.521.6:575(47)  
**(The breeding of spring wheats resistant to *Fusarium*).**  
 Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoi Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 35-58.

A serious obstacle to the growing of spring wheat in the region of Moscow is the presence of

\* An extended summary of this paper is on file at the Bureau.

*Fusarium* in the soil. This fungus may be present either in the grain which is sown, or it may infect the young sprouts as they emerge. Certain varieties, such as Prelude and some from Eastern Siberia, were resistant to the first type of infection; others, such as Hybrid 170, and Diamond, to the second type; Milturum 321 was highly resistant to the second, and moderately so to the first.

In the resistant varieties, the disease, though always present at the base of the plant, never extended beyond the coleoptile, and did not affect the roots. The plants of varieties which could not resist it either perished or grew into weakly specimens having no tillers, relying almost entirely on their primary roots, and often devoid of grain in the ear.

The species of the infecting fungus which were isolated were *F. avenaceum* (Fr.) Sacc., *F. culmorum* (W.G.Sm.) Sacc., and species of the *elegans* type. Contrary to the usual belief that *F. culmorum* is the species which is responsible for most of the infection, the authors attribute the damage to *F. avenaceum* to which, however, Hybrid 170 and Milturum 321 are resistant.

The degrees of resistance of each variety to the different species of *Fusarium* do not always exhibit any discernible consistency. One variety, under certain conditions, may be more resistant than another, and under different conditions, less resistant. It was observed that early sowing, when the temperature is low, results in less infection than when sowing has been late; and also that large seed and good management do much to reduce the incidence of *Fusarium* infection, especially in a variety which is not resistant to it.

The most resistant varieties so far produced are Hybrid 170 (the product of a local Norwegian wheat resistant to *Fusarium*, and Blue Stem from the U.S.A.), Milturum 321, Tulun 81/4, Tulun 120/32. Milturum 321 x Marquis (line 331/17 obtained by selection at Tulun) resulted in a hybrid No. 68 which, thanks to its resistance, forms a dense stand of plants. I. Z.

191. CARTWRIGHT, W. B. and LAHUE, D. W. 633.11-2.7-1.521.6:578.08  
**Testing wheats in the greenhouse for Hessian fly resistance.**  
 J. Econ. Ent. 1944 : 37 : 385-87.

A suitable technique for determining the resistance of wheat varieties to Hessian fly is described.

192. TOMULA, E. S. 633.11:664.641.016(47.1)  
 Bericht über die Untersuchungen bezüglich der Weizenernte 1940. (Report  
 on the investigations on the 1940 wheat harvest).  
 Acta Agr. Fenn. Helsinki 1943 : No. 51 : Pp. 68.  
 [From Züchter 1943 : 15 : p. 113].

This is a report on the quality and yields from the various wheats tested at experiment stations and breeding stations in Finland. The spring forms, Tammi, Tirnantti II, Söpu and Hopea are superior to Tirnantti, which is not satisfactory in baking quality owing to deficient gluten elasticity. Kimmo and the new pedigree wheat 06635 proved to be the best.

Of the winter wheats Pesola's Olympia showed the best quality and competed successfully with the best spring varieties. Some very promising lines have recently been bred. Pohjala and Varma were not so good.

The wheats imported from Sweden were inferior to the native forms.

193. ATKINS, I. M., QUINBY, J. R. and DUNKLE, P. B. 633.11:664.641.016:575.12(73)  
**New, early maturing Wichita wheat.**  
 Sth. Seedsman 1944 : 7 : No. 7 : p. 24.

Wichita is a new hard red winter wheat derived from a selection of the cross Early Blackhull x Tenmarq. It resembles Early Blackhull but has superior milling and baking quality.

194. SANDSTEDT, R. M. and FORTMANN, K. 633.11:664.641.016:581.02  
**Effect of environment during the growth and development of wheat on the baking properties of its flour.**  
 Cereal Chem. 1944 : 21 : 172-88.

The degree of response of the baking quality of wheat to environmental changes is a varietal character. Varieties with a low loaf volume potentiality respond little to environmental changes while varieties with a high volume potentiality do the reverse. Similarly, varieties with short mixing requirements respond least to environmental fluctuation.



## OATS 633.13

195. FRÖIER, K. 633.13:551.556.3:575(48.5)  
633.1:551.556.3:575(48.5)  
Nyare förädlingsframsteg av betydelse för havreodlingen i Norrland. (**Recent progress in breeding of importance for oat cultivation in Norrland**).  
Lantmannen 1944 : 28 : 271-73.

The production of Diamant spring wheat and other early maturing spring cereal varieties has greatly extended the possibilities of spring cereal cultivation in northern latitudes. The new early maturing varieties recently produced by breeding include Björn [Bear] rye, produced by Fr. Nilsson, which ripens somewhat before Förädlad Wasa II rye, and combines improved standing capacity with good grain quality and a winter-hardiness equal to that of the best land races. The new Edda barley, produced by J. E. Sidén and released in 1943, has yielded 10% more than the best barleys hitherto produced for Norrland, such as Vega and Dore, and is also promising in strength of straw, grain quality and earliness.

Information is given regarding the earliness of the main oat varieties, expressed as the number of days by which they precede Stjärn [Star] and Guldregn II [Golden Rain II]. Thus Vit Odal [White Odal] ripens 4-5 days before Guldregn II, and Weibull's Bambu is 3 days later except in southern Norrland; Primus and Vidar ripen 1-2 days before Vit Odal, and Orion II and Same 4-5 days before Vit Odal; No. A32/438 from Svalöf belongs to the same class as Same. The fourth group comprises the Finnish land oats and Mesdag, which ripen 3 days earlier than Orion II and Same; no breeders' variety has yet attained this degree of earliness; both the Finnish land oats and Mesdag are some 10% below Orion II in yield, and Mesdag is distinctly weaker in the straw. Crosses were therefore made by A. Åkerman at Svalöf between Orion II and Mesdag and between Orion II and Sv.25/356, a very early black oat line obtained by selection from a north Bottnian land oat found as an impurity in a six-row barley from the Piteå district. The most promising selections from these crosses gave rise to the variety Same, which has proved equal to Orion II in earliness and quality and somewhat better in strength of straw; in grain yield it is undoubtedly superior in the northerly tracts, where an average yield increase of 10% has been registered.

Further breeding work for the production of improved oats for Norrland consists in crossing varieties from northern Sweden or northern Finland with southern Swedish varieties of the Probststeier type, such as Guldregn, and crossing the Orion varieties, especially Orion II, with early varieties of the land type, Gopher oats and others. At the Västernorrland branch station crosses of Seger [Victory] x Gopher, Perle [Pearl] x Stjärn [Star] and Orion x Primus are showing promise of producing valuable material.

The need for a greater number of regional sub-stations for testing the plant breeder's products in different areas of the northern provinces is emphasized.

196. STANTON, T. R. 633.13:575(73)  
**Registration of varieties and strains of oats, XIII.**  
J. Amer. Soc. Agron. 1944 : 36 : 445-46.

The variety Cedar is described. It is a selection of Victoria x Richland and combines early maturity, high yield and superior quality with satisfactory resistance to most races of rust and smut.

197. HIRSCHHORN, E. 633.13-2.451.2-1.521.6:575.127.2  
Adiciones y correcciones a las especies del género 'Ustilago' en la Argentina.  
(**Additions and corrections to the species of the genus 'Ustilago' in Argentina**).  
An. Soc. Cient. Argent. 1942 : 133 : 217-18.

*Avena nigra* has so far not been attacked by *U. levis* (*U. Kolleri*) and is thought to be of possible value in hybridization.

## RYE 633.14

198. NEEL, L. R. 633.14:575(76.8)  
**Balbo rye—Tennessee's discovery.**  
Sth. Seedsman 1944 : 7 : No. 6 : 17, 32, 33.

Balbo is a newly named variety introduced from Italy. It is a good early pasture rye for the upper Southern U.S.A., and resembles Abruzzi but is more winter-hardy.

199. NEAL, N. P. 633.15:575(89)  
Informe sobre cultivo de maíz en el Uruguay. (**Report on maize cultivation in Uruguay**).  
Admin. Nac. Combust. Alcohol y Portland, Repub. Orient. Uruguay, Montevideo 1944 : Pp. 56.

A general account is given of maize cultivation in Uruguay, and although up to now flint types have been mainly cultivated, there are indications that dent varieties giving better results could be found. The methods of hybrid corn production in the U.S.A. and Canada are described. It is thought that the application of similar methods in Uruguay would make it possible greatly to extend maize cultivation and the immediate initiation of a hybrid maize programme is urged. In the meantime, until the required inbred lines are available, intervarietal crosses are being made; top-crosses are also being tried. Greater attention to the production of sweet corn is also recommended.

200. 633.15:575"793"(73.81)  
Nueva variedad de maíz breve mejorada por una selección y cultivo cuidadoso. (**New improved variety of early maize by selection and careful cultivation**).

Rev. Agric. Guatemala 1943 : 20 : Nos 10, 11 and 12 : 64-65.

By careful seed and plant selection a strain of white maize has been produced which ripens in Guatemala in 120 days, as opposed to 200 days and more required by the common varieties, and bears larger cobs than the so-called Maiz Cuarenteno.

201. 633.15:575.11  
GRANER, E. A. 633.15:576.312.34  
Observações sobre o estudo da genética nos estados unidos da América do Norte. (**Observations on the study of genetics in the U.S.A.**).  
Bol. Soc. Brasil. Agron. 1943 : 6 : 293-308.

The author describes a year's study tour which he made in the U.S.A. and the investigations he carried out in the course of it. These included studies of the inheritance of orange and yellow aleurone colour, and of various X-ray mutant characters, and observations on the chromosome knobs and the effect of ultra-violet rays on various South American lines of maize. The South American varieties Cateto and Acre were found to have very few knobs, whereas the variety Santa Rosa, a hybrid between Brazilian and north American varieties, had many. An outline is given of the system of genetics teaching in the United States.

202. SPRAGUE, G. F. and  
JENKINS, M. T. 633.15:575.12  
**A comparison of synthetic varieties, multiple crosses, and double crosses in corn.**  
J. Amer. Soc. Agron. 1943 : 35 : 137-47.

Comparative tests indicate that synthetic varieties do not yield better than open-pollinated varieties although an increased yield is theoretically possible. Multiple crosses involving sixteen lines compared favourably with standard double crosses, and may prove useful where seed cost is a factor of importance.

203. KVAKAN, P. 633.15:575.12(49.7)  
O nekim gospodarskim svojstvima križanaca kukuruza 1 generacije. (**Some industrial qualities of first generation maize hybrids**).  
Arhiv Minist. Poljopr. 1939 : 6 : No. 15 : 27-46.

Twelve pedigree maize lines were crossed in 72 different combinations. Some of the pedigree lines were of American origin, and the rest were obtained by self-pollinating local commercial varieties. Some of the inbred lines, after 10-12 generations of selfing, were still healthy and set seed fairly well.

Commercial lines were grown as controls and gave an average yield of 178.9  $\pm$  2.29 gm. per plant. Almost all crosses gave yields higher than this; combinations involving the line Ki as pollen parent afforded the only exceptions, the average yield of these crosses amounting to 181.3 gm. Yields of up to 256.4 gm. per plant were obtained in some of the other combinations. Graphs are given showing the yield of the pure lines compared with those of the various combinations in which they served as male and female parents.



The protein content of the hybrids did not differ materially from that of the commercial varieties and was either intermediate between the parents or slightly less.

In 1000 corn weight the hybrids exceeded the parents, being sometimes higher and sometimes lower than the commercial varieties.

204.

633.15:575.12(74.9)

**Plowshares and swords.**

64th Rep. N.J. St. Agric. Exp. Sta.; 56th Rep. N.J. Agric. Coll. Exp. Sta.  
1942-43 (1943) : Pp. 64.

The new hybrid New Jersey No. 5 is a silage and fodder type obtained from crossing inbred lines of white and yellow maize.

205.

HAYES, H. K.,  
MURPHY, R. P.,  
RINKE, E. H. and  
BORGESON, C.

633.15:575.12(77.6)

**Minhybrid corn varieties for Minnesota.**

Bull. Minn. Agric. Exp. Sta. 1941 : No. 354 : Pp. 40.

The performance and adaptability of the following Minnesota maize hybrids are described: Minhybrid 404 (A322 x A334) (A374 x A375), Minhybrid 405 (A311 x A334) (A374 x A375), Minhybrid 500 (A71 x A73) (A7 x A12), Minhybrid 501 (A73 x A142) (A7 x A12), Minhybrid 502 (A322 x A334) (A344 x A347), Minhybrid 600 (A26 x A28) (A7 x A12), Minhybrid 601 (A94 x A145) (A7 x A12), Minhybrid 602 (A357 x A392) (A334 x A344), Minhybrid 603 (A322 x A334) (A357 x A344), Minhybrid 604 (A340 x A322) (A344 x A347), Minhybrid 700 (A140 x A155) (A7 x A12), Minhybrid 701 (A145 x A155) (A7 x A12), Minhybrid 702 (A96 x A158) (A116 x A131) and Minhybrid 800 (A96 x A148) (A116 x A131).

206.

KRUG, C. A.,  
VIÉGAS, G. P. and  
PAOLIÉRI, L.

633.15:575.12(8)

**Híbridos comerciais de milho. (Commercial maize hybrids).**

Bragantia, S. Paulo 1943 : 3 : 367-552.

The development of the modern methods of maize breeding in the U.S.A. is described and the breeding programme of the Instituto Agronômico at Campinas, S. Paulo, is outlined. A large variety collection is maintained by pollinating a number of selected plants in each variety with a mixture of pollen from other selected plants of the same variety. Imported varieties have not so far proved equal to the local varieties but some of them have been used in hybridization. The methods used in hybridization are described and the type of plant it is desired to produce is defined. The hybrids produced are tested in all the different climatic and soil regions of the state of S. Paulo.

The work was started in 1932 and consisted first of all in self-fertilizing the local varieties Cateto, Cristal and Amparo. The variety Amparo proved to be extremely heterozygous and only 10% of the selfed cobs were selected in the first generation. Selfing of other varieties began in later years and the first crosses were made in 1936. The plant height was 40% higher in the hybrids than in the inbred lines and the spike length was 38% greater; the hybrids were also much healthier. In 1937-8 the plant height was less in the hybrids and top-crosses than in the original varieties grown as controls, and disease resistance was greater in the hybrids and top-crosses than in the control varieties. In some localities none of the hybrids out-yielded the control varieties, in others some hybrids yielded 15-30% more than the best of the controls. In 1938-39 some of the hybrids, both single and double crosses, excelled the best controls in yield and in number of cobs per plant in certain localities but not in others; the hybrids again were generally shorter than the controls. In 1939-40 too the hybrids were shorter and more disease resistant and some of them yielded more than the best of the controls. The double crosses proved much more disease resistant than the single crosses. This year, for the first time, some of the hybrids were selfed, with the object of producing a second series of selfed lines. The opinion is expressed however that for the time being the best results will generally be obtained from the lines arising directly from the selfing of an existing variety. Similar results were reported in 1940-41, most of the hybrids being more uniform, shorter and more disease resistant, and bore cobs with more regularly disposed grains; in yield some of the hybrids exceeded the best control variety by up to 47%.

In 1941-42 the 10 lines showing the best combining abilities were crossed in all possible directions. The best hybrids usually came from crosses between lines of different varieties and very rarely form different lines of the same variety. The interpolation of a sib cross after the third generation of selfing has been found, however, to prevent an undue loss of vigour.

A total of 3793 hybrids have been studied and out of these, 133 (or 3.5%) were significantly superior to the respective controls. The superiority to the controls varied from 7 to 92%; one of the hybrids at Campinas produced a yield amounting to 7.590 kg. per ha. A synthetic variety produced by crossing three simple hybrids yielded 37% more than the control. Only seven of the top-crosses made exceeded the controls.

More than half the hybrids made were of the yellow flint type but the yellow dent types have given higher yields and more attention is to be given to this type in the future.

The best of the single crosses was one of the hybrids of Amparo x Cateto, with a yield increase of 76% over the control. Great annual fluctuations were observed however and hybrids which were markedly superior to the controls in one year were often inferior in other years. The double crosses exceeded the controls by 11-23%.

Hybrids between varieties excelled the controls by 30-50%, the excess being greatest when the parent varieties were of very different geographical origin. Some of these hybrids did well in a number of different localities and years, others varied very much from season to season and from place to place. The F<sub>2</sub> generation obtained from some of these variety crosses also yielded quite well, others showed a marked fall in productivity.

An examination of the pedigree of the best hybrids showed that certain parent lines were especially frequent among them. These lines were therefore classed as parents of good combining ability. One of the best of all was No. 483-2-1-2, which, in addition to good combining ability, was also characterized by vigorous growth and high yield.

207. MORRISON, G. 633.15:575.12:007

**Grand old man of hybrid corn.**

Seed World 1944 : 55 : No. 7 : 16, 18, 20.

The breeding achievements of Dr G. H. Shull are shortly described, in particular his work with hybrid maize.

208. LANGHAM, D. G. and GORBEA, O. 633.15:575.42.061.6(87)

**Maiz blanco Venezuela-3, una selección de alto rendimiento. (The white maize Venezuela-3, a high yielding selection).**

Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1944 : No. 5 : Pp. 3.

The variety Venezuela 1 (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 821) contains a certain proportion of plants with white grains and by selecting a number of such cobs and sowing the seed and subjecting the progeny to further selection, a white grained variety was obtained, which in almost all other characters is identical with Venezuela 1; its vitamin A content however is much lower.

209. 633.15:576.16

BRIEGER, F. G. 633.15:575.127.5:581.466

**Origem do milho. (Origin of maize).**

Rev. Agric. Piracicaba 1943 : 18 : 409-18.

On the basis of a study of the maize types found in the basin of the river Paraguay the author concludes that some of these represent a close approximation to the ancestral type. Some of the *tunicata* forms contained a certain number of hermaphrodite flowers in the tassels and by selecting for this character it was possible to produce forms with as many as 500 mature seeds in the tassel. This effect was achieved solely by the action of modifiers, being independent of whether the *Tu* gene was homozygous or heterozygous.

Later, the *tunicata* type was crossed with *Euchlaena mexicana* and in the F<sub>1</sub> and F<sub>2</sub> a number of modifications of the flower were observed which are unknown in either of the parental species and which are all characters of a primitive type associated with wild forms. Certain *Tu* plants were found, for instance, with two rows of female florets in the spike, brittle rachis and long pointed glumes, the basal portion of the spike being male and the apical portion female. The nearest wild form to which these plants show any resemblance is *Tripsacum australe*, recently found in Mato Grosso and Paraguay. They are thought to approximate more closely to the probable wild ancestral maize than anything yet found.



In discussing the views of Mangelsdorf and Reeves (cf. "Plant Breeding Abstracts", Vol. X, Abst. 760) on the origin of *Euchlaena*, the author points out that his  $F_2$  results from *Euchlaena* x *Zea* crosses would indicate the genetic differences between the two genera to be greater than Mangelsdorf and Reeves suppose. For this and other reasons the genus *Euchlaena* is regarded as having an origin distinct from that of *Zea* and *Tripsacum*.

The maize forms of the Paraguay basin are in many respects more primitive than any found elsewhere. One of these is described as a pop-corn having very salient rows in pairs, usually 4 in number, in the form of a cross, well developed glumes covering up to half the grain, corneous in structure, and a fine flexible rachis; the spike often bears grains only at the base, the apical portion bearing only male flowers. The forms described show many resemblances to some of the segregates from the cross *tunicata* x *Euchlaena*, although they do not contain the gene *Tu*. The importance of the modifier shift as a factor in evolution is illustrated by the results here described.

210. GOMES, R. 633.15:576.16(81)

O milho e os "índios coroados" do Paraná. (**Maize and the coloured Indians of the Paraná**).

Chacaras e Quintais, São Paulo 1942 : 66 : 588-89.

This brief article quotes Indian legends concerning the origin of maize and describes various ways in which the local inhabitants make use of it.

211. PADDICK, M. E. 633.15:581.14:575.125

**Vegetative development of inbred and hybrid maize.**

Res. Bull. Ia Agric. Exp. Sta. 1944 : No. 331 : 376-99.

Hybrid maize is shown to develop more rapidly and to attain a larger size in several of its organs than its parental inbreds.

212. GRANER, E. A. 633.15:581.48:575.11.061.6

Genética da côr amarela-laranja nas sementes do milho. (**Genetics of yellow-orange colour in maize seeds**).

Rev. Agric. Piracicaba 1943 : 18 : 443-45.

The yellow colour of the seed in maize is determined by the genes,  $Y_1$  and  $Y_3$ , though the exact shade may vary from pale yellow to orange according to the presence of modifiers. By rigorous selection it has been possible to isolate lines however in which this difference, yellow-orange, behaves as if controlled by a single gene. A new gene complementary to  $Y_1$ , in combination with which it produces a pale yellow endosperm in the absence of  $Y_3$ , has been found in the variety Cateto and named  $Y_5$ . An inhibitor of the yellow pigmentation is found in some of the South American maize strains.

Quantitative differences in vitamin A activity have been observed between strains that are practically identical in shade of pigmentation.

The variety Cateto also contains a gene for a non-carotenoid lemon-yellow pigmentation of the aleurone, located in chromosome 7.

213. ANDERSON, E. and CUTLER, H. C. 633.15:582(77.8)

**Races of *Zea Mays*: I. Their recognition and classification.**

Ann. Mo Bot. Gdn 1942 : 29 : 69-88.

The difficulties attending the intraspecific taxonomy of *Z. Mays* are discussed with specific reference to Central and South American forms. Several of these races are described and characterized biometrically.

214. ECKHARDT, R. C. 633.15.00.14(76.8)

**1942 Tennessee corn performance tests.**

Tennessee Sta. 1943 : Pp. 5.

[From Exp. Sta. Rec. 1944 : 90 : p. 181].

Data on yields and lodging are given for hybrids and varieties.

Tennessee hybrids Nos 10, 14 and 15 are recommended as the best available to Tennessee farmers, while Jellicorse and Neal Paymaster are recorded as outstanding standard season varieties. Thompson Prolific and Yellow Thompson, two earlier maturing varieties, though superior at higher elevations, do not equal U.S. 13 in yield. U.S. 13 is, however, of mediocre quality owing to inferior husk protection.

215. HAYES, H. K. 633.16:575(73)  
**Barley varieties registered, IX.**  
 J. Amer. Soc. Agron. 1944 : 36 : p. 444.  
 The variety Glacier, a selection from Atlas x Vaughn, is a six-rowed white-seeded hulled barley with high yielding capacity and stiff straw. It is highly resistant to covered smut.
216. POPE, M. N. 633.16:575:578.08  
**Some notes on technique in barley breeding.**  
 J. Hered. 1944 : 35 : 99-111.  
 The methods of barley breeding are described, special attention being paid to the technique of artificial hybridization.
217. JOHNSON, I. J. and ÅBERG, E. 633.16:575.116:575.127.2  
**The inheritance of brittle rachis in barley.**  
 J. Amer. Soc. Agron. 1943 : 35 : 101-06.  
 Genetical studies involving varieties Peatland and C.I. 4821 of *Hordeum vulgare* and one strain of *H. agriocrithon* have established the following genetic constitutions respectively:  $BtBtbt_1bt_1$ ,  $bttbt_1Bt_1Bt_1$ , and  $BtBtBt_1Bt_1$ . The character brittle rachis is expressed only in the presence of both  $Bt$  and  $Bt_1$  and is therefore found in the  $F_1$  progeny of the cross Peatland x C.I. 4821, two varieties having a tough rachis.  
 Rachilla colour and hair length are inherited monomerically in crosses of these three varieties and the genes determining colourless lemma and long-haired rachilla have been shown to be allelic in the two species.  
 No linkage could be found between brittle rachis, glume colour or rachilla hair length.
218. SWENSON, S. P. and WELLS, D. G. 633.16:575.116.1  
**The linkage relations of four genes in chromosome I of barley.**  
 J. Amer. Soc. Agron. 1944 : 36 : 429-35.  
 Linkage studies have been made of chromosome I, the order of the genes now located being: *tr-v-rin-h-e-y-f-lg-or*. Plant height is governed by the interaction of the main gene pair  $Hh$  with the modifier pair  $H_1h_1$ . Rachis internode number is similarly governed by the main gene pair  $Rin\ rin$  and the modifying factors  $Rin_1\ rin_1$ .
219. BRINK, R. A. 633.16:575.127.5:633.14:576.356  
 COOPER, D. C. and AUSERMAN, L. E.  
**A hybrid between *Hordeum jubatum* and *Secale cereale*.**  
 J. Hered. 1944 : 35 : 67-75.  
 A single plant has been reared from the cross *H. jubatum* x *S. cereale* by the dissection of the embryo from the seed and subsequent cultivation on an artificial medium. The hybrid was sterile, forming 5 loosely associated bivalents and 11 univalents at metaphase I.
220. COOPER, D. C. and BRINK, R. A. 633.16:575.127.5:633.14:581.3:581.162.5  
**Collapse of the seed following the mating of *Hordeum jubatum* x *Secale cereale*.**  
 Genetics 1944 : 29 : 370-90.  
 BRINK, R. A. and COOPER, D. C.  
**The antipodal in relation to abnormal endosperm behavior in *Hordeum jubatum* x *Secale cereale* hybrid seeds.**  
 Ibid. 1944 : 29 : 391-406.  
 The early abortion of the embryo formed in the hybrid *H. jubatum* ♀ x *S. cereale* ♂ is attributed to the effects of abnormal endosperm development which is, in turn, regarded as a consequence of starvation brought about by the failure of the normal post-fertilization development of the antipodal cells. A similar sequence of events occurs in the hybrid *H. vulgare* x *S. cereale*.



221. FREISLEBEN, R. and

LEIN, A.

633.16:575.243:537.531:578.08

Vorarbeiten zur züchterischen Auswertung röntgeninduzierter Mutationen. I. Die in der Behandlungsgeneration ( $X_1$ ) sichtbare Wirkung der Bestrahlung ruhender Gerstenkörner. (**Preliminary studies on the evaluation, from the standpoint of breeding, of mutations induced by X-rays. I. The observable effect in the  $X_1$  of irradiation of dormant barley grains**). Z. Pflanzenz. 1943 : 25 : 235-54.

FREISLEBEN, R. and

LEIN, A.

Vorarbeiten zur züchterischen Auswertung röntgeninduzierter Mutationen. II. Mutationen des Chlorophyllapparates als Testmutationen für die mutationsauslösende Wirkung der Bestrahlung bei Gerste. (**Preliminary studies on the evaluation, from the standpoint of breeding, of mutations induced by X-rays. II. Mutations of the chlorophyll system as test mutations for the action of irradiation in eliciting mutations in barley**). Ibid. 1943 : 25 : 255-83.

In Part I previous work in different countries is surveyed. Systematic mutation breeding began in Germany in 1941.

The second paper deals with technique. The choice of suitable material is discussed. A diploid two-rowed variety, Haisa, which is one of the highest yielding German pedigree barleys, was selected. The problem of dosage and the method of irradiation is discussed. The experiments lasted two years. In the first year (1941) a range of 4-14 kr. (1 kr. = 1000 r.) was used. In the second year (1942) a dosage of 10 kr. was mainly used but some tests with 20-25 kr. were also made to test Fröier and Gustafsson's 1941 results. The most effective dose was found to be 10-15 kr. for air-dry grains.

Sprouting trials showed that the first effect of irradiation was a definite slowing down of development of the grains, but even with the highest dosage all grains germinated. The degree and also the frequency of the various types of injury increased with the dosage. Incidentally evidence was found in favour of Wertz's (1940) finding that the primary injury is dependent on multiple hits (Mehrtrefferabhängigkeit).

Cultivation of the  $X_1$  showed that the retardation in development of the plants was also operating on tillering and in direct proportion to the dosage.

Fröier and Gustafsson's technique and findings are critically examined.

In the authors' view 20-25% survival among the plants should be the aim in order to obtain the optimum degree of injury and the maximum number of mutations.

As regards the causes of injury in the  $X_1$ , evidence is cited from the authors' experiments and those of others that in breeding operations simple germination tests cannot be used to determine sensitivity to irradiation. For the more severe degrees of injury that set in soon after germination has begun the reactions of the nucleus to the rays must be the decisive factor; and these are based not on lethal gene mutations but on structural chromosome changes and their subsequent effects which include fragmentation, inversion and translocation.

The effect of irradiation on embryonic meristematic tissue in the seedlings and of regeneration capacity as the factor inhibiting or retarding development in sprouting tests is discussed, as well as the tendency to chimaera formation in plants from irradiated seedlings.

The possible causes of infertility in the  $X_1$ , e.g. mitotic disturbances, deletion, inversions, etc., are enumerated, and it is concluded that, in addition to such structural changes, gene mutation resulting in lethal gametes or zygotes may also be the cause of the sterility observed. The relation between gene mutations and small structural mutations in such cases is difficult to elucidate.

The chimaerical character of the  $X_1$  plants was for the first time clearly shown in the differences in fertility in sectors derived from different cell complexes with different mutation types; this feature could be observed within a plant or within a single ear. Branched ears too may often occur, probably as a result of regeneration of the damaged growing point from different cell complexes; and the component ears nearly always show clear differences in fertility.

The complicated relations between dosages and the incidence of the sterility classes and spacing of the plants are not yet clear.

Though no cytological studies had been made of the authors' material, the disturbances in

fertility in the  $X_2$  indicated that in nearly all progenies structural hybridity was present in some plants, though apparently the frequency of such hybrids was almost independent of the degree of fertility (or sterility) of the parent plant. Whether these include new true breeding karyotypes has still to be ascertained by experiment.

The degree to which the chimaerial character is expressed is affected by the extent of the retardation of development by the irradiation and also by the ground space available for the individual plant.

In addition to this environmental selection acting upon the chromosome changes in the irradiated plants, a selective action also operates on the haploid phase and many structural alterations are eliminated in the process of gamete formation. This will also happen to any true gene mutations (or unifactorially segregating mutations) before they can be phenotypically exhibited. The relationship between gene mutations and the results of chromosome alterations should be examined.

In part II the authors suggest that the process discussed in part I may also affect the production of gene mutations in which case chimaerial structure may also occur in the  $X_1$  plants. Since dominant mutations are very rare in barley, the  $X_2$  must be studied in order to detect mutations and homozygous progenies must also be studied where small mutations are concerned, e.g. some of those affecting physiological characters. In other types of small mutations, such as those affecting resistance and quality, special methods of mass selection may be devised permitting the examination of as large amounts of material as possible with certainty and rapidity for the particular aim in view (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 203).

Other considerations with reference to operations of selection for individual mutants are examined before the writer discusses the conditions under which the maximum number of mutations can be not only produced but also detected. This problem is treated in the light of the authors' experiments on mutations of the chlorophyll system in barley (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 511). These defects are defined as representing a heterogeneous character group. The possibility that they may be due not only to gene mutations but also to small deletions is mentioned.

The same material as in the experiments in part II was used in this investigation and the results are discussed under the following heads: mutability of the individual ear series in 1942; and mutability in the tests of progenies of individual plants from the standpoint of the mutation frequency, and its relation to mutation type, fertility and dosage. The question is also discussed from the theoretical aspect whether the aim in selective breeding should be the detection of all mutations that occur and whether selection on the basis of the largest number of progenies within a limited range will ensure that a greater number of mutations are obtained.

In conclusion detailed recommendations are given for the conduct of a mutation experiment on barley when breeding for a particular object.

222. POPE, M. N. and BROWN, E. 633.16:581.142  
**Induced vivipary in three varieties of barley possessing extreme dormancy.**  
 J. Amer. Soc. Agron. 1943 : 35 : 161-63.

Viviparous development of winter barley has been induced in three varieties characterized by extreme seed dormancy. The technique used involved the removal of the lateral flowers and the application of damp filter paper to the exposed embryo ends of the seeds.

223. EKDAHL, I. 633.16:581.192:576.356.5  
**Comparative studies in the physiology of diploid and tetraploid barley.**  
 Ark. Bot. 1944 : 31A : Häfte 2 : No. 5 : Pp. 45.

A detailed comparison has been made of the biochemical composition and physiological properties of the stem, leaf and root of diploid and tetraploid barley.

224. KOUDELKA, V. 633.16:581.6:575(49.7)  
 Udio pljevica u sastavu našeg proljetnog i ozimog pivarskog ječma. (**The proportion of husk in the composition of our summer and winter malting barleys**).  
 Arhiv Minist. Poljopr. 1939 : 6 : No. 15 : 47-54.

Selections of Tschermak's two-row winter barley have proved very successful for cultivation in



Jugoslavia and for malting purposes. Their husk percentage has however been said to be higher than that of the local two-row spring barleys. Tests were made therefore of the husk percentage and other qualities in these and a number of other varieties, including some Czechoslovakian two-row summer barleys. Data are given for germination capacity, 1000 corn weight, protein content and husk percentage. The selections from Tschermak's barley were heavier in the grain and lower in protein than the local summer two-row varieties; the protein content was 11.5% on a dry weight basis. The husk percentage also proved lower than that of the best local or Czechoslovakian two-row summer barleys; the average husk percentage of the selection was 9.5 but some lines were as low as 8.4, the highest being 10.8%. There was no correlation between protein content and husk percentage.

Selections have been made among the local four-row winter barleys to improve their yield, quality and cold resistance. They have also been crossed with Tschermak's barley. The average 1000 corn weight of the pure lines was 32.4 gm., their protein content was low and their husk percentage rather high. The two-row segregates from crosses with Tschermak's barley had a 1000 corn weight of about 45 gm., their protein content was higher than that of the Tschermak parent, as was also the husk percentage; they are thus not suitable for malting purposes.

225. MIDDLETON, G. K. and  
McMILLEN, R. W. 633.16-2.111-1.521.6:575.12.061.5  
**Winter survival of rough- and smooth-awned barleys.**  
J. Amer. Soc. Agron. 1944 : 36 : 626-27.

A positive correlation has been established between rough awned spikelets, winter survival and yielding ability in the  $F_2$  progenies of six barley crosses.

226. HONECKER, L. 633.16-2.4-1.521.6:575:578.08  
Resistenzzüchtung gegen Mehltau und Rost bei Gerste. Erfahrungen und  
Ergebnisse vierzigjähriger Züchtungsarbeit. (**Breeding for resistance to  
mildew and rust in barley. Experience and results of 40 years of  
breeding**).  
Z. Pflanzenz. 1943 : 25 : 209-34.

Having briefly outlined the economic importance of breeding for disease resistance and early efforts in Bavaria to control disease by breeding, the writer discusses recent measures in systematic breeding for resistance in barley from the standpoints of (a) the economic importance of the different diseases in barley; and (b) ways and aims of systematic breeding to control the individual diseases.

Honecker's work on breeding for mildew in barley is recorded (cf. "Plant Breeding Abstracts", Vol. II, Abst. 442, Vol. V, Abst. 369 and Vol. IX, Abst. 265).

The practical results so far achieved in breeding with this object have shown that a mildew resistant form obtained by breeding cannot be regarded as suitable for general cultivation unless it can compete successfully in areas and in years free from mildew with the best susceptible varieties.

Pleiotropy and partial linkage are important factors in breeding for mildew resistance (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 203), and in selecting resistant forms for hybridization particular attention must be paid to secondary effects of the resistance genes and to the importance of the grouping of genes in various ways in different crosses as part of the technique of finding satisfactory resistant hybrids.

The incidence of rust in mildew resistant and mildew susceptible varieties and differences in disease reaction in the field and in the green house are important considerations in the breeding for mildew resistance.

Numerous experiments indicate that the higher yields obtainable through the use of mildew resistant, but yellow rust susceptible, varieties may be completely counterbalanced by the loss due to the latter disease. Furthermore, the author has found that on strains resistant to yellow rust, but susceptible to mildew, the latter disease continues to develop extensively after shooting, while it was clearly dying down on rust susceptible varieties. Similar relationships are found between mildew and dwarf rust. In addition, certain leading high yielding German commercial varieties susceptible to yellow rust, brown rust and mildew in the greenhouse have been found to exhibit resistance which is attributed to a type of pathogenic equilibrium. Partial resistance to one of the three pathogens concerned destroys this balanced state and results in reduced yields. In the writer's opinion it is essential to breed for combined resistance to mildew and the two

rusts and to treat the problem as a whole. In recording some details of his own findings on varietal resistance of barleys to yellow rust, Straib's findings on rust races are discussed at length and it is suggested that his theory of "progressive mutation" with reference to race 46 of yellow rust might explain the origin of the more virulent race 24 from race 23 and its relatively rarer incidence in southern Germany. Similar "subsidiary and chance" races of barley mildew also exist.

The author has been successful in combining winter hardiness and mildew and yellow rust resistance by suitable crossing and back crosses of a two-rowed winter malting barley derived from (Heils Franken, a two-rowed spring form x Friedrichswerther Berg, a four-rowed winter form) x Tschermak's two-rowed form.

The next trials to be made should concentrate on the problem of what undesirable features may accompany yellow rust resistance of winter barley as a result of partial linkage, pleiotropy or physiological correlation.

Until these complex relationships have been elucidated, practical breeding will be concentrated on selection for yellow rust resistance among the older mildew resistant breeding stock, using field infection and laboratory selection at various stages in the investigation.

The different position in regard to dwarf rust in Germany, and Straib's contribution to the problem are explained (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 860). The author's hybridization experiments, in which the four-rowed Bolivia C.I. No. 1257, Weider C.I. No. 1021, Salm C.I. No. 1022, the Australian Recka and the two-rowed Australische Frühe [Australian Early] were used as parents, tended to support the view that the considerable field resistance exhibited in the resulting plants is largely independent of race specialization of the fungus. The robustness of the whole group of varieties concerned tends to suggest some morphological cause for the resistance in these experiments.

Years of progeny tests with seedlings subjected to infection under greenhouse conditions have not yet clearly solved the mode of inheritance of the resistance here. The intermediate infection types have proved more or less labile according to variety and environment. It is not yet clear whether field resistance to dwarf rust depends on one or more genetic factors, but some results suggest that several polymeric genes may be involved.

Some crosses of varieties resistant in the field to dwarf rust with susceptible high quality malting barleys, gave rise to resistant two-rowed forms of good malting quality after repeated back-crossing. It seems likely that there is partial linkage between the number of rows and certain genetic components of field resistance, and it is intended at Weihenstephan to cross the station's yellow rust and mildew resistant malting strains with some of the few available two-rowed resistant varieties, e.g. the two very early yellow rust and dwarf rust resistant forms Morgenrot (Halle) and 4509/33 (Heine), both derived from an early two-rowed Australian spring barley from the Halle Station after crossing with German yellow rust resistant malting barleys.

One cross of spring forms in the Weihenstephan experiments which may, it is believed, prove successful in combining resistance to the two rusts and mildew with high yield and good malting quality is [Isaria x (Ciewener 403 x Pflugs Intensiv)] x (Sulu C.I. 1022 x Isaria).

Similar work with winter barleys presents several difficulties, e.g. segregation of the polygene complex for winter-hardiness following hybridization with spring forms; and the need for testing hardiness under more severe conditions than usually prevail at Weihenstephan.

Varieties ultimately obtained with combined resistance to all three fungi must of course equal existing high grade barleys in all other economic characters.

227. LOVE, H. H. and

CRAIG, W. T.

633.16-2.421.1-1.521.6:575(74.7)

**Wong, a winter barley for New York.**

Bull. Cornell Agric. Exp. Sta. 1943 : No. 796 : Pp. 15.

The winter barley Wong is described. It arose as a selection from Orel x an unnamed Szechuan variety, and is characterized by its strong straw and mildew resistance.

228. SHANDS, H. L. and

ARNY, D. C.

633.16-2.484-1.521.6

**Stripe reaction of spring barley varieties.**

Phytopathology 1944 : 34 : 572-85.

The resistance of 375 barley varieties to a strain of *Helminthosporium graminum* Rabh. has been investigated. Physiological specialization of the fungus is not believed to affect seriously the general applicability of these results.



229. SCHEIBE, A. 633.17:576.16:581.9  
 Die Hirsen im Hindukusch. Ein Beitrag zur Kenntniss von Kulturpflanzen in geographischer Rückzugsposition. (Ergebnisse der Deutschen Hindukusch-Expedition VI). [The millets in the Hindukush. A contribution to the knowledge of cultivated plants which are geographically in a "retreat position". (Results of the German Hindukush Expedition VI)].  
 Z. Pflanzenz. 1943 : 25 : 392-436.

This paper deals with (1) Russian work on the *Panicum* and *Setaria* millets in Afghanistan; (2) a description of the material and methods of the German expedition; (3) observations on the species and types contained in the seed material collected, their variation and the geographical origins and distribution of the various types, with notes on the systematics of the millets including *Andropogon* species; (4) the diagnoses of the herbarium material; (5) the geographical position of the Hindukush millets; and (6) the practical value of the material for breeding and as fodder, etc. Among the points of special interest to plant breeders are the following:—

In addition to the wealth of morphological forms and varieties of *P. miliaceum* in the Hindukush regions, there are numerous genotypes of this species that can only be revealed by the cultivation of the individual forms for a period of years and not merely by morphological analysis.

Evidence from the southern valley of the Hindukush indicates that, in addition to a great diversity of the small and large millets (*S. italica* ssp.), *Setaria viridis* P.B. also occurs side by side as a wild form, as a weed and even as a "cultivated wild cereal" and on an extremely narrow geographical area—a fact which is an important link in the construction of the phylogeny of *Setaria*.

From an analysis of the evidence regarding the millet forms in the southern Hindukush areas, Nuristan and adjoining Chitral, the author postulates not only a gene centre, but also a pronounced centre of origin and development, at least for *Setaria italica* ssp. The bearing of Russian work on this problem is examined. In the author's opinion, the millets of the southern Hindukush represent, as it were, an island, from the standpoint of both historical culture and plant geography, i.e. a characteristic "retreat position"; and for the millets this region must be regarded as a highly valuable "maintenance centre" of preservation. The phylogenetic significance of the *Panicum* and *Setaria* millets of the region in question is critically examined. Results obtained in investigations on the practical value of the Hindukush millets for cultivation in Germany and other countries are summarized. Forms regarded as promising for breeding, selection or cultivation in Germany are mentioned, with their places of origin.

Selection of forms from the Hindukush material of *S. italica maxima* is not regarded as advisable in view of the universal competition which this sub-species has to meet from maize.

Illustrations, maps and a bibliography are included.

230. \*MOGILEVA, A. M. 633.171-1.524(47)  
 (The choice of original material from which to breed early varieties of millet).

Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoi Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 59-78.

Though millet is not usually grown in the European part of the U.S.S.R. north of a line joining Minsk, Smolensk, Moscow, Ivanovo, Gorkii, Čeboksary, and Sverdlovsk, recent experience has shown that it is possible to grow it as far north as Leningrad where, despite the long days, the growing period is prolonged by no more than 10 to 15 days, and the yield amounts to 20 or more centners per hectare.

The main concern of the plant breeder who desires to extend the cultivation of millet northwards is to produce varieties which mature early and are unaffected by the length of the daylight period. Millet is sensitive to cold, and will not form an evenly ripened head of seed should cold weather supervene before maturity has been reached.

Three hundred and forty specimens of millet were collected in the province of Moscow. There were two types of panicle among them: (1) *effusum*, which is spreading and branching in habit, and (2) *compactum*, which was compact. There were other morphological characters which also distinguished the one type from the other. All the millets were hairy, which perhaps accounted

\* An extended summary of this paper is on file at the Bureau.

for the absence of any serious pests among them; and among several of the varieties there was an anthocyanin coloration in various parts of the plants, most pronounced in the *effusum* type, but of sufficiently frequent occurrence in both to distinguish these millets from those grown further south.

More than 12 botanical varieties were identified, namely, vars *flavum*, *sub-flavum*, *coccineum*, *sub-coccineum*, *cinereum*, *sub-cinereum*, *tadium*, *sub-tadium*, *aureum*, *sub-aureum*, *sanguineum* and *sub-sanguineum*. The prefix, *sub*-, distinguishes the type of each variety which possesses the anthocyanin shade from the other which does not. The coloured types were usually better as regards yield and other characters than the uncoloured types.

The varieties, *sub-flavum* and *aureum*, constitute the main part of most of the populations; the others appear as impurities, though not all of them are to be considered as undesirable in themselves.

As regards maturity, the millets were divided into four groups: those which mature early, those which mature late, and two intermediate groups. Data regarding yield, tillering, the various phases of development, and other matters of use to the plant breeder were collected. I. Z.

231. STEPHENS, J. C. 633.174:575.116.1.061.6  
**Linkage of green-striped-2 in sorghum.**  
 J. Amer. Soc. Agron. 1944 : 36 : 469-70.

A gene  $gs_2$  is described which determines pale green stripes in the seedling leaves of sorghum. It is not linked to  $gs_1$  but exhibits cross-over percentages of 23 and 31 with genes  $ms_2$  and  $a$  respectively.

232. KARPER, R. E. 633.174-2.411.4-1.521.6:575(73)  
**Registration of sorghum varieties, IV.**  
 J. Amer. Soc. Agron. 1944 : 36 : p. 453.

Westland is a double dwarf variety with a head resembling kafir; it is resistant to milo root rot. It arose as a selection from Wheatland, probably after natural hybridization with a yellow-seeded milo type.

233. HEYNE, E. G.,  
 MELCHERS, L. E. and  
 LOWE, A. E. 633.174-2.411.4-1.521.6:575.115:581.02  
**Reaction of  $F_1$  sorghum plants to milo disease in the greenhouse and field.**  
 J. Amer. Soc. Agron. 1944 : 36 : 628-30.

Resistance to milo disease in the  $F_1$  hybrids of resistant x susceptible crosses appears to be intermediate between that of the parents, the dominance relationship shifting with the environmental conditions.

234. VAHEEDUDDIN, S. 633.174-2.451.2:576.16:575.127.5  
**The pathogenicity and genetics of some sorghum smuts.**  
 Tech. Bull. Minn. Agric. Exp. Sta. 1942 : No. 154 : Pp. 46.

Details are presented of investigations into the genetics of *Sorghum* smuts. *Sphacelotheca Sorghi* is a highly variable species, comprising many biotypes and at least 60 sexual groups. New physiological races may arise through intraspecific hybridization. Some account is also given of the genetics of peridial wall colour.

*Sphacelotheca cruenta* and *Sorosporium Reilianum* are interfertile, the  $F_1$  hybrid being heterotic. Many different types of sori are produced in the  $F_2$  generation of this cross, some resembling *Tolyposporium filiferum*.

## RICE 633.18

235. HOUSSAYE, D. A. DE LA 633.18:575.11.061.633  
**A chlorophyll deficiency in rice.**  
 Proc. La Acad. Sci. 1943 : 7 : 27-34.

An account is given of the mode of inheritance of a chlorophyll deficiency in the cross C.I. 1239 x C.I. 5810.



236. HOUSSAYE, D. A. DE LA 633.18:575.116.1.061.6  
**Independent assortment, interaction of factors and linkage studies  
 in the  $F_2$  of a rice cross.**  
 Proc. La Acad. Sci. 1942 : 6 : 52-59.

A genetical study has been made of the  $F_2$  progeny of the cross C.I. 1239 x C.I. 5810. Sheath colour, hull colour and bran colour segregated according to a 3 : 1 ratio; awning and shattering in a 13 : 3 ratio; endosperm composition in a 9 : 7 ratio; and a chlorophyll deficiency according to a 15 : 1 ratio. Three possible cases of linkage have been found.

237. JODON, N. E.,  
 RYKER, T. C. and  
 CHILTON, S. J. P. 633.18-2.484:576.16:631.521.6:575.11  
**Inheritance of reaction to physiologic races of *Ceicospora oryzae* in  
 rice.**  
 J. Amer. Soc. Agron. 1944 : 36 : 497-507.

The genetics of resistance to four races of *C. Oryzae* has been investigated in thirty-five  $F_2$  crosses. Monohybrid, dihybrid and polyhybrid modes of inheritance were found.

### FORAGE GRASSES 633.2

238. 633.2/3:575(74.8)  
**Seventh Annual Report of the U.S. Regional Pasture Research  
 Laboratory.**  
 State College, Pa 1943 : Pp. 121. (Mimeographed).

The report gives an account of the studies on the breeding, genetics and cytology of pasture grasses and white clover at the Regional Laboratory and at the co-operating state stations.

J. L. F.

239. VINOGRADOVA, N. M. and  
 NOVODEREŽKINA, M. A. 633.2:575(47)  
**(The breeding of fodder grasses).**  
 Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoï  
 Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 113-44.

Most of the grasses considered were collected in the provinces of Moscow, Ivanov, Vologda, Archangel, Kirov, and in the region of the Urals; some also came from White Russia, the Ukraine, the north Caucasus, the Transcaucasian republic and the territory at Altai.

The region from which the grasses were obtained provided material likely to be suitable for the Moscow province and the central districts of the non-Black-Soil zone. Ecological types of the following species are discussed: *Festuca pratensis*, *Dactylis glomerata*, *Phleum pratense*, *Festuca rubra*, *Agrostis alba*, *Lolium perenne* and *Alopecurus pratensis*.

As regards selection and breeding, the usual method employed was family selection without spatial isolation, or polyandrous breeding. Mass selection and inbreeding were also practised. These methods are compared. Though investigation into inbreeding is still in its preliminary stages, several families of *F. pratensis* have been produced, with promising results.

The use of a glasshouse is recommended in order to hasten the succession of generations, which may also be achieved by sowing the seeds of a single harvest both in summer and autumn, for it was found that seed was fit to sow immediately after harvest.

I. Z.

240. KELLER, W. 633.262:575.12:578.08  
**The bulk hybridization of smooth brome grass.**  
 J. Hered. 1944 : 35 : 49-56.

The relative efficiencies of the various techniques of bulk hybridization are discussed with reference to *Bromus inermis* Leyss.

241. TSIANG, Y. S. 633.262-2.482-1.521.6:581.6  
**Variation and inheritance of certain characters of brome grass,  
*Bromus inermis* Leyss.**  
 J. Amer. Soc. Agron. 1944 : 36 : 508-22.

Varietal differences have been found between strains of *B. inermis* in respect of the following characters: resistance to *Selenophoma bromigena* (Sacc.) Sprague et Johnson, morphological features, and  $\beta$ -carotene, magnesium and potassium contents.

242.

SULLIVAN, J. T.

**Further comparisons of plants with different chromosome numbers in respect to chemical composition.**

J. Amer. Soc. Agron. 1944 : 36 : 537-43.

Tetraploid plants of *Lolium perenne*, when grown in the field, show a slight decrease in percentage dry matter and a slight increase in sugar content and in alcohol soluble dry matter, when compared with the diploid type. When grown in culture solution, the differences are similar, except that the decrease in percentage dry matter of the tetraploids is only noticeable in young plants, and the increase in sugar content only found in mature specimens.

Octoploid plants of white clover have a lower fibre and carotene content than the tetraploids.

243.

JOHNSON, H.

**Meiotic aberrations and sterility in *Alopecurus myosuroides* Huds.**

Hereditas, Lund 1944 : 30 : 469-566.

An exhaustive account is given of the cytology of *A. myosuroides*. There are seven haploid chromosomes which behave regularly in meiosis, but on inbreeding, the following aberrations may occur: absolute asynapsis, partial asynapsis, premature centrosome division, stickiness, hypercontraction, retarded meiosis, polynitosis, syncyte formation, male sterility and female sterility. In most cases, these aberrations are determined by comparatively simple factorial schemes. A colchicine-induced tetraploid exhibited half the meiotic chromosomes in the form of quadrivalents.

### LEGUMINOUS FORAGE PLANTS 633.3

244.

TYSDAL, H. M. and

KIESSELBACH, T. A.

**Hybrid alfalfa.**

J. Amer. Soc. Agron. 1944 : 36 : 649-67.

A review is given of the advantages and methods of hybrid lucerne production. It is pointed out that selection for self-sterility is advantageous and that heterosis may be considerable in certain combinations. Compatibility relations are complex and must be considered in the light of the polyploid nature of the species.

245.

ANDREWS, A. L.

**Fighting clover, 'Manganese' extends its front.**

Sth. Seedsman 1944 : 7 : No. 6 : 13, 40, 41.

STURKIE, D. G.

**A clover 'worth growing'.**

Ibid. 1944 : 7 : No. 6 : 13, 41.

Manganese is a new variety of bur clover (*Medicago denticulata*) characterized by early development and high productivity. It was developed from a single plant selection discovered near LaFayette.

246.

JULÉN, G.

**Investigations on diploid, triploid and tetraploid lucerne.**

Hereditas, Lund 1944 : 30 : 567-82.

Morphological and cytological studies are reported on diploid forms of *Medicago sativa* and *M. sativa* x *M. falcata*, also on triploid and tetraploid derivatives obtained by the colchicine technique. Optimum vegetative vigour was found in the triploids. Meiosis in the diploids is irregular, univalents and multiple associations occurring at metaphase I. No increase in the frequency of aberrations is found in the triploids and tetraploids and both of these latter two types are pollen fertile. It is concluded that the diploid members of these species are, in fact, tetraploid.

247.

WEIHING, R. M. and

ROBERTSON, D. W.

**The comparative performance of alfalfa varieties in nursery and field plots in irrigated soil infested with *Phytomonas insidiosa*.**

J. Amer. Soc. Agron. 1943 : 35 : 125-36.

Experiments have been done in order to discover the most advantageous lay-out for lucerne variety field tests in irrigated soil.



248. SCHWANBOM, N. 633.321:575(48.5)  
 Weibulls Original Resistenta rödklöver i jämförelse med andra rödklöver-  
 stammar. (**Weibull's Original Resistenta red clover in comparison  
 with other red clover strains**).  
 Weibulls Ill. Årsb. 1944 : 39 : 19-22.

Further information has become available on the performance of this new strain derived from the Danish strain Ötofte Halvsildig [Ötofte Medium Late] put on the market in 1941. Both in Weibullsholm experiments and in trials run by the Scania Seed Growing Association (Skånes Fröodlingsförening), Resistenta is stated to have surpassed all other competitors of the medium late type. It is also recommended for its seed production and for resistance to clover eelworm and clover rot.

249. MOGILEVA, A. M. 633.35:575(47)  
 (**Breeding spring vetch**).  
 Truby Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoi  
 Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 101-11.

A variety of vetch is needed in the non-Black-Soil belt which not only will yield abundant foliage but can be relied upon to ripen seed in any year. In the search for vetches which answer to these requirements, and are in addition of a suitable height, fine and tender, freely branching, leafy, bear pods which do not easily split, are able to grow without a nurse crop, and are immune to fungal diseases, varieties were obtained from Italy, Bulgaria, Syria, Turkey, France and Sweden, as well as a few from the U.S.S.R. They were divided into three groups, according as they matured early, late, or between these extremes.

By means of the selection and hybridization described, it was sought to combine the plentiful foliage of the late and intermediate varieties with the early maturity, and consequent ability to ripen seed, of the early varieties.

Among the lines which showed promise, No. 323-4 was isolated. The Bulgarian varieties gave rise to No. 2135, which was early, fine-stemmed, vigorously branching and having pods which did not split easily. A very freely branching mutation was also obtained by the action of X-rays on the variety Kazan No. 8. Combinations in which No. 2135, the branched mutant, and others, were components, resulted in several useful hybrids. I. Z.

250. VORONJIK, B. A. 633.35:575.3  
 (**The relationship between agriculturally desirable characters in  
 spring vetch and the date of seed production**).  
 Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoi  
 Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 85-91.

The seed of vetch from the lower pods of a plant flowered sooner, and produced larger plants than seed from the upper pods of the same plant. In the succeeding generation, no differences were observed as regards the time of flowering, but the plants from seed formed in the lower pods were again larger than the progeny of the upper pods. The author does not venture to conclude that transmission by inheritance was responsible for such a difference, but points out the practical value to be derived from it.

It was also observed that, although the interval between the attainment of ripeness and the sowing of seeds from the lower pods was longer and was associated with more vigorous growth than was the case relating to seed from the upper pods, seed which had been stored too long produced plants reduced in vigour. I. Z.

251. ŠMYGUN, V. N. 633.35:581.162.32:578.08  
 (**An investigation into methods of hybridizing spring vetch**).  
 Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoi  
 Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 93-99.

The technique of cross-pollinating spring vetch is described.

252. JOSEFSSON, A. 633.367:575(48.5)  
 Några synpunkter på förädlingsarbetet med lupin. (**New points of view on breeding operations with lupins**).  
 Sverig. Utsädesfören. Tidskr. 1944 : 54 : 104-14.

An account is given of the uses of sweet and bitter lupins and of early and recent work on lupin improvement for Swedish and other conditions, including the investigations by O. Tedin and by von Sengbusch. Selection of blue bitter lupins grown in Sweden should aim at good yields of green fodder and of seed. It would be of interest to know the content of bitter substance at various stages of development. One line of blue bitter lupin has already been handed over to the General Swedish Seed Co., Ltd (Allm. Svenska Utsädesaktiebolaget).

The Swedish Seed Association has found that the mutational changes producing the blue sweet lupin may have a very unfavourable effect on seed setting, even when flowering is profuse. Nevertheless the blue sweet lupin might acquire a certain value in Swedish agriculture if its fertility could be improved and its developmental period shortened, and provided suitable soils are available.

The primary aim in hybridization of blue sweet and bitter forms should be to obtain a blue lupin without the bitter principle but with the earliness and good yield of the bitter lupin. Tedin in 1938 crossed the blue sweet lupins with lines obtained from blue bitter lupin, the object being to eliminate all bitter plants as early as the  $F_2$ ; but spontaneous crossing caused difficulties and at times the amount of the bitter principle in the leaves examined was so small that the relatively simple methods of analysis used gave too weak reactions. Selection had therefore to be repeated. Many lines are however now ready for yield trials. Preliminary trials in 1943 showed that the strains tested contained from 5 to 10% bitter plants, but the yield of seed was high and many strains were almost as early as the bitter type.

Another combination was made of pink bitter and blue sweet lupin, the aim here a sweet lupin of the same type as the blue flowered one but with a high yield of green forage. The pink form shows remarkable growth and flowers early, though it actually ripens later than the blue form. The yellow sweet lupin is drought resistant, probably owing to its particular type of vegetative rhythm, and it has softer stems than the blue and a greater mass of foliage. Its fibre content tends to be higher than that of the blue lupin. One important aim is to breed a yellow sweet lupin with a short flowering period and thus more uniform ripening. Earliness must therefore also be included in the breeding programme, and of course good yielding capacity. Unfortunately the only material the Association has is a population of yellow bitter lupin introduced by Tedin from seed of wild strains in Portugal in 1940. Though this material contained many types, all were considerably later than the yellow sweet lupin. With the seed obtained, mass selection and in 1942 crosses of selected early individuals with yellow sweet lupin were made in hopes of producing a type with the good features of vegetation and seed of the yellow lupin. In 1944 selection had reached the  $F_3$ .

The tendency of the pods to split on ripening or drying are defects which must be eliminated if possible.

Induced mutation by X-rays is also being explored, primarily in the search for early types.

A first collection has also been made of perennial lupin for observation and selection and the seed was sown this year. According to Danish and German reports this form contains less bitter substance than the annual.

253. COOPER, J. F. 633.367:575(73)  
**The lupines : for bitter . . . or for sweet?**  
 Sth. Seedsman 1944 : 7 : No. 6 : 26-27.

An account is given of the efforts being made to breed sweet strains of blue and yellow lupins suitable for the U.S.A.

254. MALHEIROS, N. 633.367:576.312.35  
 Elementos para o estudo citológico do género *Lupinus*.  
 (Cytological study of the genus *Lupinus*).  
 Agron. Lusitana 1942 : 4 : 231-36.

The following chromosome numbers were established: *L. albus* L.,  $2n = 50$ , *L. angustifolius* L.,  $2n = 40$ , *L. luteus* L. and *L. Rothmaleri* Klink,  $2n = 52$ , *L. mutabilis* Sweet.,  $2n = 48$ , and *L. Cosentini* Guss.,  $2n = 32$ .

In *L. angustifolius*, chromosomes with median constrictions were found as well as those with non-median (cephalobrachial) constrictions.



255. PANČENKO, JA. I. 633.4:575(47)  
**(Breeding fodder root crops).**  
 Trudy Zonal'nogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoj  
 Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 :  
 No. 10 : 161—79.

The purpose of the experiments described with swedes, forage turnips and mangolds was to produce varieties of those crops, the yields of which would be higher, the proportion of dry matter larger, and the completion of maturity sooner than in the varieties hitherto grown in the vicinity of Moscow. It was also sought to produce mangolds which could be relied upon to ripen seed near Moscow.

The methods of attaining these aims are described in some detail.

As regards swedes, a well-formed bulbous root and a short neck were obtained by means of selection. Hybridization between swedes and different types of turnip led to no striking results. Mass selection gave rise to an improved variety of forage turnip. It was found that roots could be discovered which were not only large but also contained a large proportion of dry matter; that the content of dry matter was largest in those plants having the largest proportion of foliage; and that the elements K and P in the soil favoured the increase of dry matter.

In order to hasten the succession of generations, the plant breeder is recommended to transfer roots at the end of their first season to the glasshouse, and by means of moderate warmth and artificial illumination, to produce seed from them for spring sowing. I. Z.

256. HERTZMAN, N. 633.416:575(48.5)  
 Weibulls Original Slättbo Barres II, stam 16. Landets mest odlingsvärda  
 foderbeta. **(Weibull's Original Slättbo Barres II, strain 16. The  
 fodder beet most worth growing in the country).**  
 Weibulls Ill. Årsb. 1944 : 39 : 8—11.

Reasons for the popularity of the Barres beets are given. The new strain is stated to be the most useful at present on the market. It was produced by individual selection from Slättbo, strain 76, and was put on the market in 1941. In colouring and shape it differs little from the parent strain, but some roots of lighter colour occur. In view of its considerably higher yield of dry matter as compared with the parent strain, its fine shape, dry matter content, storage properties, and the fact that it can be lifted with ease, strain 16 is highly recommended.

257. LAMPRECHT, H. and 633.416:575(48.5)  
 HERTZMAN, N.  
 Weibulls Original Regia, stam 24, ny fodersockerbeta. **(Weibull's Original  
 Regia, strain 24, a new sugar mangel).**  
 Weibulls Ill. Årsb. 1944 : 39 : 12—13.

The new strain, put on the market in spring 1944, was obtained from a cross between Slättbo Barres and sugar beet. It is a yellow, high yielding root, but both reddish yellow and white segregates still occur. In type, plumpness and smoothness it closely resembles Barres. It grows relatively high above the soil and is practically free from lateral roots and therefore as easy to harvest as Barres. The foliage is tall and vigorous and the dry matter content is about 1% more than that of Bacon and Rubra.

258. LAMPRECHT, H. and 633.42:575(48.5)  
 HERTZMAN, N.  
 Weibulls Original Tellus Bortfelder, stam 21. En ny stam, som i odlings-  
 värde är överlägsen alla i marknaden befintliga rovtammar. **(Weibull's  
 Original Tellus Bortfelder, strain 21. A new strain, superior in  
 cultivation value to all existing turnip strains on the market).**  
 Weibulls Ill. Årsb. 1944 : 39 : 17—18.

The new strain, which appeared on the market in 1944, gave the highest yield both of root and dry matter in all experiments in which it was included. It is a cross between two Weibull lines. It is somewhat shorter than Ped. Bortfelder but fatter and usually has straight roots in contrast to the old Tellus strain 63. The upper part of the root is green, the flesh, yellow and the foliage large and vigorous. The new strain is easy to lift, and contains about 1% more dry matter than Ped. Bortfelder, which it exceeds in dry matter per unit of area. It is claimed to be the most useful variety on the market for cultivation.

259. WEIBULL, W. 633.42:575(48.5)  
 En maning till vårt lands rotfruktsodlare. (**A warning to our root crop growers**).  
 Weibulls Ill. Årsb. 1944 : 39 : 6-7.

The importance of root crops to the Swedish farmer at present, and the value of the varieties and strains produced at Weibullsholm are pointed out. Incidentally, Weibull's Immuna II is recommended as the turnip most resistant to club root, and resistant swedes are promised within a short time.

260. CHOPINET, R. 633.42:575.127.5:635.15:576.356.5:581.04  
 Sur quelques hybrides expérimentaux interspécifiques et intergénériques chez les crucifères.  
 (**Some experimental interspecific and intergeneric hybrids among the crucifers**).  
 C.R. Acad. Sci. Paris 1942 : 215 : 545-47.

The following hybrids have been obtained by using diploid and tetraploid parent varieties: *Brassica Napus* L. ( $n = 38$ ) x *B. oleracea* L. var. *gemmifera* DC. ( $n = 18$ ), *Raphanus sativus* L. ( $n = 18$ ) x *B. oleracea* L. vars Chou de Milan [Milan cabbage] and Brussels sprouts ( $n = 18$ ), *R. sativus* L. ( $n = 18$ ) x *B. Napus* L. ( $n = 19$ ), and *R. sativus* L. ( $n = 18$ ) x *Sinapis arvensis* ( $n = 9$ ). The hybrids are usually intermediate between the parents in morphological character and may exhibit heterosis. Colchicine induced tetraploids have been obtained from *B. chinensis* L., *B. Rapa* L. var. *silvestris* (Lam.) Purchas et Ley, *S. alba* L., *S. arvensis* L. and *R. rugosum* L.

261. NICOLAISEN, W. 633.426:575(43)  
 Züchtung von Raps. (**Breeding rape**).  
 Z. Pflanzenz. 1943 : 25 : 362-79.

The two main varieties of rape in Germany are Lembke's and Janetzki's. In future breeding, existing German varieties should undergo further selection and land varieties or escaped pedigree forms should be maintained and foreign varieties and local forms imported from Poland, Russia, Scandinavia, etc.; some Moravian varieties are known to be more winter hardy than Lembke's winter rape. Hybridization should also be used, advantage taken of mutations, and the possibilities of obtaining desirable polyploid types investigated, though tetraploids appear to be less winter-hardy. Methods of artificial cross-pollination and local testing and raising of the breeding material are briefly outlined. Natural selection in the locality of origin, and the climate of the district where selection for winter-hardiness is carried out are important factors in breeding cold resistant forms. This is borne out by the performance of the winter rape varieties Lembke and Janetzki in various parts of Germany and Central Poland. The Stieglersche and Kraphauser selections are also promising winter-hardy forms.

The author believes it should be possible to combine the non-splitting pod character with high yields. So does Becker of the Dippe Company in Quedlinburg, who has been working with hybrids of a Swedish land variety with Lembke's and Janetzki's rapes. At Quedlinburg there are also breeding strains in which the seed ripens before the pod and harvesting can therefore be conducted without shedding occurring.

Methods of identifying non-splitting pods are touched upon. It is unlikely that forms could be bred resistant to insect attack which in some instances may cause shedding.

Regeneration capacity which may often be connected with winter hardiness is another varietal feature of importance which is found in a high degree in Lembke's winter rape. It is often accompanied by another varietal character, namely capacity for luxuriant growth, with which maximum seed production is also apparently associated. Winter-hardiness, drought resistance, earliness, climate, etc., are factors which may influence the capacity for luxuriant growth. Observations of varieties in the Danzig area in 1941 showed that earliness is an important feature in resistance to insect injury, and the ideal rape should if possible combine earliness with high yield. The inter-relations between climatic and other factors must be taken into account in choosing varieties for different regions. In Eastern Germany natural selection has led to the survival of earlier and less luxuriant forms which should provide particularly suitable material for breeding types for the Eastern area. Work on these lines has already been started in the Lankischken area in East Prussia under the Erwin Baur Institute.

Rapid development in the early stage, a factor in insect pest control, has been found to vary in different progenies and a similar variation occurs in the onset of development.



Varieties tolerant of poor soils do not give as high yields, even on good soil, as the more exacting types. It is unlikely that a "universal" type can be produced and the tolerant and intolerant types will have to be bred separately.

Length of flowering period, plant height, number and size of pods, oil content, mustard oil content, immunity to fungous and animal parasites and tolerance of late sowing are also the concern of the breeder.

Lambke's rape is one of the tallest varieties and the eastern varieties (from Sobotka and Janetzki) and the south German Niederarnbach and Hohenheim varieties are much shorter. The ideal stem should not be too strong, and branching, a desirable feature, should begin at about a half metre above the ground. Resistance to lodging is exemplified particularly by Lembke's variety. A medium sized pod is to be preferred since too large a pod usually means fewer pods and a lower yield.

Though increased yield of seeds may apparently go with a reduction in oil content, selection for oil content should be continued in the future. Breeding for quality should also take into account mustard oil content and possible protein content too.

A suitable type of summer rape could probably be produced in Germany by crossing winter varieties of good yielding capacity with existing summer strains from various localities; the aim should be the production of forms that develop sufficiently luxuriantly but do not flower too early.

The breeding of fodder rape should aim at the production of a palatable and at the same time winter hardy type which develops as rapidly as possible in the spring. Rapko (the cabbage-rape form), though superior in palatability, is not sufficiently hardy. Janetzki has long been endeavouring to create a fodder rape with a higher proportion of leaf.

Resistance to fungous diseases and pests depends on various heritable and environmental characters; and breeders should include resistance to nematodes, *Plasmodiophora* (of cabbage) and *Alternaria* in their programmes. The question of state support of rape breeding and seed production is also considered.

262. HERTZMAN, N. 633.426:575(48.5)  
Weibulls Original Drottning Kålrot, stam 38. En idealiskt vacker kålrot med hög avkastning. (Weibulls Original Drottning swede, strain 38. An ideal, fine swede with high yield).  
Weibulls Ill. Årsb. 1944 : 39 : 14-16.

Strain 38 has been derived by mass selection from Sutton's Queen. Drottning [Queen] appeared on the market in 1911 and new elite strains have been obtained from it since. It varies from round to short oval. The colour of the top is green with bronze purple shading. The variety has large foliage and particularly small neck. The root is well shaped, and has very few lateral roots, grows quickly and keeps well with a very high total yield and yield of dry matter. It is somewhat sweeter than other swedes. In addition it is less susceptible to bacterial disease than other strains.

263. METCALF, H. N. and HARDENBURG, E. V. 633.491:575  
Potato culture and storage investigations reported during 1941 and 1942.  
Amer. Potato J. 1944 : 21 : 91-115.

This report on potato research includes a section on varietal studies.

264. COSTA, A. S. 633.491:575(73)  
633.491:575(81)  
Notas sobre o melhoramento da batata nos Estados Unidos. (Notes on the improvement of the potato in the United States).  
Bragantia, S. Paulo 1943 : 3 : 347-66.

The author surveys the work in progress in the United States under the National Potato Breeding Programme, dealing in particular with the methods of testing new varieties for resistance to diseases and pests.

Problems of potato variety raising in São Paulo are also discussed. Up to the present, work in São Paulo has been concerned with the selection of varieties most suited to the local conditions, but it is urged that a more comprehensive scheme on the lines of that in practice in the U.S.A. is necessary.

J. G. H.

265. STEVENSON, F. J. 633.491:575(73)

**Potato breeding, whither bound?**

Amer. Potato J. 1944 : 21 : 192-99.

The achievements of the national potato breeding programme of the U.S.A. are described and an outline given of plans for the future.

266. \*BAZAVLUK, V. JU. 633.491:575.257:581.165.71:575.255

**(The process of fusion and chimaera formation in potato grafts).**

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1940 : No. 2 : 181-97.

The author describes his experiments and methods in this study of fusion in shoot and bud grafts of potatoes and also discusses chimaera formations in such material. The findings of other workers are also considered.

267. JOSEFSSON, A. 633.491:577.16:575

**C-vitaminundersökningar på potatis. (Vitamin-C investigations on potatoes).**

Sverig. Utsädesfören. Tidskr. 1944 : 54 : 37-54.

Earlier work in Sweden on this subject has already been reviewed by O. Tedin (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 554). The present report deals with records of the vitamin C content of varieties of potatoes from various parts of Sweden, and varietal determinations in relation to growth stage and size of the tubers, season, storage and methods of cooking.

The work of the Potato Division of the Swedish Seed Association on vitamin C, and the superior ascorbic acid content of some of the new breeding material as compared with commercial varieties, are mentioned.

268. BARHAM, H. N.,

WAGONER, J. A.,

WILLIAMS, B. M. and

REED, G. N.

633.491:581.6

633.492:581.6

**A comparison of the viscosity and certain microscopical properties of some Kansas starches.**

J. Agric. Res. 1944 : 68 : 331-45.

"Varietal and environmental differences in potatoes and sweet-potatoes were reflected in viscosity, gelatinization temperature, granule size, and granule size frequency measurements of the starches obtained from them".

269. AKELEY, R. V. and

STEVENSON, F. J.

633.491:581.6:575.11

**The inheritance of dry-matter content in potatoes.**

Amer. Potato J. 1944 : 21 : 83-89.

Studies on the genetics of the dry matter content of potatoes are reported. All the five varieties tested were heterozygous in respect of tuber density and segregated for this character on selfing. High tuber density appears to be dominant, several genetic factors being probably involved.

270. RIEMAN, G. H.,

TOTTINGHAM, W. E. and

McFARLANE, J. S.

633.491:581.6:575.115

**Potato varieties in relation to blackening after cooking.**

J. Agric. Res. 1944 : 69 : 21-31.

Varietal differences in the tendency of potatoes to blacken after cooking are reported. Clonal selections usually resemble the parent variety in blackening reaction. When varieties were crossed, transgressive segregation of blackening reaction was observed in the  $F_1$  progenies, indicating that the parents were heterozygous for the relevant factors. Failure to blacken appears to be partially dominant.

271. STUART, W.

633.491:582:001.4

**Parental identity in varietal selection names.**

Amer. Potato J. 1944 : 21 : 139-40.

A short consideration is given to the proposal that parental identity should be indicated in the naming of mutant clones.

\* Very slightly abridged translation of this paper is on file at the Bureau.



272. KÖHLER, E. 633.491-2.8-1.521.6:578.08  
*Solanum demissum* Lindh. als mögliche Testpflanze des A-Virus der Kartoffel.  
**(*S. demissum* Lindh. as a possible test plant for the A virus of the potato).**  
 NachrBl. dtsch. PflSchDienst 1942 : 22 : p. 77.  
 [From Züchter 1943 : 15 : p. 116].

*S. demissum* plants infected with the Y virus exhibit only a transitory lightening of the colour of the nerves or show no symptoms; infection with the A virus on the other hand results in black, irregular, necrotic spots which spread out into necrotic stripes along the veins. It still has to be determined whether necrotic striping is a sufficiently constant and specific characteristic of A virus infection.

A similar observation was recorded in 1939 by Stelzner and a sub-species of *S. demissum* has been used as an indicator for the A virus with success, as the work of the "Vereinigten Saatzuchten" (Seed Production Combine) at Ebstorf since spring 1941 has shown.

273. HARTER, L. L. 633.492-2-1.521.6  
**Sweetpotato diseases.**  
 Fmrs' Bull. U.S. Dep. Agric. 1944 : No. 1059 : Pp. 26.

This bulletin includes notes on varietal resistance to the most important sweet potato diseases.

### FIBRES 633.5

274. BREDEMANN, G. 633.5:578.08:631.557  
 Die Bestimmung des Fasergehaltes bei Massenuntersuchungen von Hanf, Flachs, Fasernesseln und anderen Bastfaserpflanzen. **(The determination of fibre content in mass investigations of hemp, flax, fibre nettles and other bast fibre plants).**  
 Faserforschung 1942 : 16 : p. 14.  
 [From Züchter 1943 : 15 : p. 117].

The method here described is for determinations of the fibre content of hemp, flax or nettles in bulk. The end product is a cottonized fibre and the output is therefore lower than from ordinary retting or from the processes worked out at Müncheberg and Sorau.

The method in question, which is a further elaboration of the technique already described in 1942, has shown its particular value for purposes of plant breeding and rapid fibre content estimations, as it can be carried out with small amounts of straw (5-15 grm.) and even with single plants.

275. KEARNEY, T. H. 633.51:575(62)  
**Egyptian-type cottons : their origin and characteristics.**  
 Bur. Pl. Ind., Soils, Agric. Eng., Agric. Res. Admin., U.S. Dep. Agric. 1943 :  
 Pp. 23. (Mimeographed).

The history of the development of Egyptian cotton varieties is outlined and descriptions are given of the most important types, also of the derivative American Egyptian forms.

276. POPE, O. A.,  
 SIMPSON, D. M. and  
 DUNCAN, E. N. 633.51:581.162.32  
**Effect of corn barriers on natural crossing in cotton.**  
 J. Agric. Res. 1944 : 68 : 347-61.

Maize barriers are effective in reducing the degree of cross-pollination between cotton plantings, but in order to provide complete isolation, the cotton blocks must be at least a mile distant from each other.

277. SILOW, R. A. and  
 STEPHENS, S. G. 633.51:581.481:576.356.52  
**"Twinning" in cotton.**  
 J. Hered. 1944 : 35 : 76-78.

Twinning in Sea Island cottons is usually of the diploid-haploid type, the haploid component probably arising from the parthenogenetic development of an unfertilized second embryo-sac. Diploid-diploid Sea Island twins are rare and it is likely that one of the components is formed by chromosome doubling of an antecedent haploid embryo. Twins are much less frequent in Asiatic cottons and are usually of the diploid-diploid type. In this case, normal fertilization of two embryo-sacs is the probable cause.

278. WARE, J. O.,  
JENKINS, W. H. and  
HARRELL, D. C. 633.51:581.6  
**Seed characters and lint production.**  
J. Hered. 1944 : 35 : 153-60.

The location and size of fuzz tufts does not appear to affect the lint percentage, lint index, staple length or seed index of the varieties Westberry, Bleak Hall and Andrews. Naked seeds of Seabrook produce lower lint percentages and lint indices than the normal, but staple length and seed index are little affected. None of these characters appears to be significantly correlated with fuzz grade in the variety Gaddis.

279. HANCOCK, N. I. 633.51:581.6:581.02  
**Length, fineness, and strength of cotton lint as related to heredity and environment.**  
J. Amer. Soc. Agron. 1944 : 36 : 530-36.

Lint length, fineness and strength are all varietal characters and determined genetically, but are also influenced markedly by environmental conditions.

280. TURNER, J. H. (JUN.) 633.51-1.8  
**The effect of potash level on several characters in four strains of upland cotton which differ in foliage growth.**  
J. Amer. Soc. Agron. 1944 : 36 : 688-98.

Varietal response to potassium deficiency is described.

281. SCHILLING, E. 633.52:575.12  
**Bemerkungen zur Kombinationszüchtung bei Lein. (Comments on breeding flax by hybridization).**  
Z. Pflanzenz. 1943 : 25 : 380-91.

While holding the view that the limits of progress have been reached in flax improvement by selection, the author believes that in any long term breeding policy further advances may be obtained by hybridization. Under the following heads he contributes an informative discussion on what has been and might be done: the flaxes of the world; disease resistance; ecological problems; seed weight and yield of linseed; the number of seeds per capsule and seed yields; plant height and branching; industrial requirements; and the flax types and combinations of characters that must be obtained by hybridization.

282. ARNY, A. C. 633.52-2.452-1.521.6:575(73)  
**Registration of improved flax varieties, II.**  
J. Amer. Soc. Agron. 1944 : 36 : 454-57.

Two new flax varieties are described. Crystal, from Bison x 770 B, resembles Bison but is immune to all North American races of rust. Royal, selected from Crown, is a particularly high yielding flax with mature plant resistance to rust.

283. TOBLER, F. 633.52-2.452-1.521.6:578.08  
**Flachsrost und Bastfaser. (Flax rust and bast fibre).**  
Faserforschung 1941 : 15 : 132-35; also Zbl. Bact. 1943 : 106 : p. 74.  
[From Rev. Appl. Mycol. 1944 : 23 : p. 228].

Anatomical studies were made of flax varieties infected by rust (*Melampsora Lini*) in order to study the effects of the disease upon firmness and suitability for retting.

The results obtained with different varieties, e.g. Karnobat and Svalöf Hercules, show that, in estimating the damage from *M. Lini*, the action of the rust upon the fibres must be considered as well as the external symptoms of the malady.

284. GRANHALL, I. 633.522:575(48.5)  
633.522.00.15(48.5)  
**Fem års försöksverksamhet med spånadsväxter. (Five years research on textile plants).**  
Sverig. Utsädesfören. Tidskr. 1944 : 54 : 16-27, 66-83.

A revival of the cultivation of textile plants in Sweden is in progress, and measures are being taken to promote the rationalization of the industry and the production of good quality plants by research on plant breeding, methods of cultivation, preparation, machinery, technique and chemical and biological investigations.



The present report, dealing with the experiments on flax cultivation carried out by the Swedish Seed Association and by the Agricultural Research Institute (Jordbruksförsöksanstalt), gives the results of variety trials with imported flaxes or varieties either selected or bred by the Swedish Seed Association.

Detailed lists and tables are given of the main features (origin, quality, yield, seed yield, etc.) of the varieties tested in Svalöf trials from 1938 to 1942 and similar information is given for local trials of the three varieties Herkules, Blenda and Concurrent.

Cultivation is also discussed.

Some information is also given on hemp trials in Sweden with data on flowering and ripening times. Hemp breeding is directed to the discovery of a strain earlier than the German variety Schurig but equal to it in length of stem. Simultaneous maturing of male and female plants is a second objective.

285.

\*SUKACHEV, V. N.

633.584.3:575(47)

**(Work on willow breeding).**

633.584.3:575.127.2

Lesnoe Hozjaistvo (Forestry) 1939 : No. 3 : 24-34.

Extensive data are given on the work done in the U.S.S.R. on willow breeding. Many inter-specific crosses have been made and have been utilized in the Russian breeding programme which is aiming at the production of fibre willows of superior quality. The interspecific hybrids include the following: *S. acutifolia* x *S. daphnoides*, *S. dahurica* x *S. rossica*, *S. purpurea* x *S. caspica*, *S. purpurea* x *S. chilkoana*, *S. purpurea* x *S. mollissima*, *S. purpurea* x *S. rossica*, *S. rosmarinifolia* x *S. rossica*, *S. rossica* x *S. chilkoana*, *S. rossica* x *S. mollissima*, *S. rossica* x *S. triandra*, *S. tenuifolia* x *S. stenophylla*, *S. viminalis* x *S. acutifolia* and *S. viminalis* x *S. dahurica*.

286.

HÅKANSSON, A.

633.584.3:576.354.46:575.127.2

**Die Chromosomenpaarung von zwei *Salix*-bastarden. (The chromosome pairing of two *Salix* hybrids).**

Hereditas, Lund 1944 : 30 : 639-41.

The species *S. Lapporum*, *S. hastata*, *S. purpurea*, *S. aurita*, *S. viminalis*, *S. Caprea*, *S. repens* and *S. daphnoides* and probably the hexaploids *S. phylicifolia* and *S. nigricans* have very similar genomes. One genome of *S. cinerea* also resembles those of this group. In spite of this, however, the hybrid *S. Lapporum* x *S. hastata* is highly sterile even although meiosis is regular. The hybrid *S. viminalis* x *S. triandra* is also sterile but in this meiosis is irregular, many univalents occurring at metaphase I.

### SUGAR PLANTS 633.6

287.

ARCENEAX, G. and

HERBERT, L. P.

633.61:519.24:631.421

**A statistical analysis of varietal yields of sugarcane obtained over a period of years.**

J. Amer. Soc. Agron. 1943 : 35 : 148-60.

A significant increase in the variance due to the interaction of variety x station x year has been demonstrated by an analysis of data obtained from field tests in Louisiana during 1937-40. Certain varieties have shown a tendency to give comparatively larger yields from year to year, while some have done the reverse. Such changes may be due to changes in the incidence of pathogenic organisms.

288.

ABBOTT, E. V. and

SUMMERS, E. M.

633.61-2-1.521.6(76.3)

**Disease testing and initial seedling selection work at the Houma station during 1943.**

Sug. Bull., N.O. 1944 : 22 : 144-48.

The disease resisting properties of recently introduced Louisiana sugar cane varieties are described.

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\* An extended summary of this paper is on file at the Bureau.

289. CROSS, W. E. 633.61-2.451.2-1.521.6(82)  
 Variedades de caña resistentes al "carbón". (**Cane varieties resistant to smut**).  
 Bol. Estac. Exp. Agric. Tucumán 1944 : No. 45 : Pp. 24.

The results of extensive observations carried out during the last two years on the smut reaction of the varieties are presented. Certain varieties are indicated as susceptible and definitely unsuitable for planting, others which have so far remained practically free from attack. These varieties are described fully. They include various imported canes and Tuc. 379, 1111, 1406, 2622, 2645, 2680 and 2683. Other varieties are indicated as being resistant though not immune, and a further group of immune varieties still in the experimental stage are recommended for trial.

290. FORBES, I. L.,  
 MILLS, P. J. and  
 DUNCKELMAN, P. H. 633.61-2.483-1.521.6  
**The role of red rot in the windrowing for seed of present day sugar-cane varieties in Louisiana.**  
 Sug. Bull., N.O. 1944 : 22 : 148-49.

Varietal resistance of sugar cane to red rot during windrowing is described.

291. MATHES, R. and  
 INGRAM, J. W. 633.61-2.7-1.521.6:575  
**Investigations of sugarcane borer control by the use of resistant varieties.**  
 Sug. Bull., N.O. 1944 : 22 : 189-92.

Varietal differences in the borer susceptibility of sugar canes are described. Breeding is in progress to develop types exhibiting superior resistance.

292. ARCENEUX, G.,  
 HERBERT, L. P. and  
 KRUMBHAAR, C. C. 633.61.00.14(76.3)  
**Results of sugarcane variety tests in Louisiana during 1943.**  
 Sug. Bull., N.O. 1944 : 22 : 159-65.  
 GOUAUX, C. B.  
**Sugar cane test field report season of 1943.**  
 Ibid. 1944 : 22 : 166-70.

Details are presented of the results of the 1943 sugar cane varietal tests in Louisiana.

293. DAHLBERG, H. W. 633.63:575(73)  
**How your beets are being improved.**  
 Through the Leaves, Colorado 1943 : 31 : No. 4 : 20-26.

A brief account is given of the sugar beet breeding achievements of the Great Western Sugar Company.

294. OWEN, F. V. 633.63:575(73)  
**Variability in the species *Beta vulgaris* L. in relation to breeding possibilities with sugar beets.**  
 J. Amer. Soc. Agron. 1944 : 36 : 566-69.

A short review is presented on the prospects of breeding sugar beet for curly-top resistance, self-fertility, male-sterility and single-germ seeds.

295. SKUDERNA, A. W. 633.63:575(73)  
**Sugar beets in the war and post-war periods from the standpoint of the beet sugar industry.**  
 J. Amer. Soc. Agron. 1944 : 36 : 576-83.

Reference is made to the importance of breeding in the development of the sugar beet industry and the breeding objectives are defined.

296. LANTZ, E. M. 633.63:576.356.5:577.16  
**Effect of doubling the number of chromosomes of the sugar beet on the carotene and ascorbic acid contents of the leaves.**  
 Pr. Bull. N. Mex. Agric. Exp. Sta. 1943 : No. 973 : Pp. 2.

The leaves of tetraploid sugar beets have a slightly lower content of carotene and ascorbic acid than the parent diploids.



297. BINGEFORS, S. 633.71:575(48.5)  
Svensk havanna och hur den odlas. (Swedish havanna and how it is  
grown).  
Lantmannen 1944 : 28 : 483-85.

This paper contains, in addition to its main subject, a note on how tobacco originally reached Sweden and a brief mention of local varieties that have developed, e.g. Tofta, Per Pers, Yngsjö, Fjälkinge and Rinkaby.

Following a grant in 1940 from the Tobacco Monopoly, tobacco breeding has been taken up by Svalöf and is located at Ugerup. Numerous crosses have been made, though at first sandstorms were a considerable hindrance.

298. RAPIN, J. 633.71:575(49.4)  
Le rôle de la culture du tabac dans la vallée de la Broye dans l'intensification  
de la production agricole. (The role of tobacco cultivation in the valley  
of La Broye in the intensification of agricultural production).  
Ber. Schweiz. Bot. Ges. 1943 : 53A : 116-23.

Numerous variety trials carried out by the Mont-Calme Federal Seed Testing Station at Lausanne and other bodies have shown the difficulty of finding a tobacco to replace the improved variety widely grown in Switzerland, Mont-Calme Brun, which originated from a cross of White Burley and Amersfoort made at the above-mentioned station in 1906. The resultant population multiplied freely in the valley of La Broye, where it became adapted by natural selection to local conditions. In 1927 an improvement in quality was sought by cross-pollinating by White Burley. Among the numerous resulting types one with the modified Burley characters has produced a line (not yet fixed) called Mont-Calme Jaune, which shows many ancestral features. A second type, apparently fixed, gave rise to Mont-Calme Brun, which is well adapted to the country and widely grown throughout the valley of La Broye. It is early but could be still further improved in this respect by further hybridization with types from countries with a similar climate to that of the region for which the new form is intended.

299. BRIEGER, F. G. and 633.71:575.115:581.45  
FORSTER, R.  
Modificação da dominância em *N. Tabacum petiolaris*. (Modification of  
dominance in *N. Tabacum petiolaris*).  
Rev. Agric. Piracicaba 1943 : 18 : 446-47.

The character petiolate leaves had previously been reported as a simple dominant. A line extracted from earlier crosses was crossed with 6 other lines of *N. Tabacum* and in 4 of the crosses the character behaved as a simple recessive. In the remaining two crosses it was dominant as expected. Back-crosses also showed marked deviations from the expected ratios and the effect is ascribed to the action of modifiers.

300. SIMONET, M. and 633.71:576.356.5:575.127.2  
FARDY, A.  
Comportement cytogénétique d'un hybride amphidiploïde fertile, *Nicotiana  
tabacum* L. var. *purpurea* Anast. ( $n = 24$ ) x *N. sylvestris* Speg. et Comes  
( $n = 12$ ), obtenu après traitement à la colchicine. [Cytogenetic behaviour  
of a fertile amphidiploid hybrid, *N. tabacum* L. var. *purpurea* Anast.  
( $n = 24$ ) x *N. sylvestris* Speg. et Comes ( $n = 12$ ), obtained by colchicine  
treatment].  
C.R. Acad. Sci. Paris 1942 : 215 : 378-80.

The  $F_1$  normal and amphidiploid hybrids of the cross mentioned are described. Meiosis in the normal hybrid ( $2n = 36$ ) is very irregular, while, although some aberrations are observed, meiotic behaviour of the amphidiploid ( $2n = 72$ ) is quite regular and up to 95% of the pollen may be fertile.

301. TOMUR, K. 633.71:581.142:581.035  
Tütün tohum çeşidlerinin intaş muayenelerinde ziya faktörünün ehemmiyeti.  
(The importance of light in the germination of different kinds of  
tobacco seeds).  
Tütün Institüsü Raporlari 1943 : 3 : No. 1 : 9-12.

The findings of other authors as to the favourable effect of light on the germination of tobacco seed of different Turkish varieties were confirmed. These preliminary experiments show the need for further comparative trials of all varieties as a supplementary basis for seed control of Turkish tobaccos.

302. DAWSON, R. F. 633.71:581.165.71:581.192  
**Accumulation of anabesine in reciprocal grafts of *Nicotiana glauca* and tomato.**

Amer. J. Bot. 1944 : 31 : 351-55.

Alkaloid distribution has been studied in reciprocal grafts of *N. glauca* and tomato. Nicotine synthesis, not demonstrable in intact plants of *N. glauca*, appears to occur in the roots of this plant when forming a stock for a tomato scion, the alkaloid being translocated to the tomato leaves. Anabesine synthesis is possible both in roots and shoots of *N. glauca* and is found in scions of this plant when grafted on to tomato.

303. İPEKOĞLU, F. 633.71:581.45:575-181  
**Tütünün korelatif vasıfları üzerinde bir tedkik. (A study on correlative characters of tobacco).**

Tütün İstitüsü Raporları 1943 : 3 : No. 2 : 5-8.

Correlations were found in tobacco between height and the number of leaves and between number of leaves and maturity. In the same variety total yield is not affected by the number of leaves, owing to a decrease in leaf thickness. Leaf colour is determined by curing, but usually bright fresh leaves in the field give a bright coloured leaf after sun curing.

In general, nicotine content is low in Turkish tobacco and there is no relation between colour of dry and fresh leaves and their nicotine content.

304. VALLEAU, W. D.,  
 JOHNSON, E. M. and  
 DIACHUN, S. 633.71-2-1.521.6  
**Tobacco diseases.**

Bull. Ky Agric. Exp. Sta. 1942 : No. 437 : Pp. 60.

This bulletin includes accounts of varietal resistance of tobacco to the following diseases: black root rot (*Thielaviopsis basicola*), wilt (*Fusarium oxysporum* var. *Nicotianae*) and mosaic.

305. SMITH, T. E. 633.71-2.3-1.521.6  
**Control of bacterial wilt (*Bacterium solanacearum*) of tobacco as influenced by crop rotation and chemical treatment of the soil.**

Circ. U.S. Dep. Agric. 1944 : No. 692 : Pp. 16.

This circular includes a brief account of varietal resistance to bacterial wilt.

306. KRUG, C. A. and 633.73:575.11(81)  
 MENDES, A. J. T. 633.73:576.312  
**Conhecimentos gerais sobre a genética e a citologia do gênero *Coffea*. (General state of knowledge on the genetics and cytology of the genus *Coffea*).**

Rev. Agric. Piracicaba 1943 : 18 : 399-408.

The investigations in progress at the genetics section of the Instituto Agronômico, Campinas, S. Paulo, include: a study of the geographical distribution of the genus, collection of the species and varieties, study of the chromosome numbers, chromosome morphology and meiotic behaviour in species and interspecific hybrids, chromosome duplication by colchicine treatment (a fertile hexaploid has been obtained by treatment of a sterile diploid hybrid of *C. arabica* x *C. canephora*), and genetic studies of a number of leaf and plant characters in *C. arabica*, such as dwarf, maragoge, erect branches, polyspermy, continuous flowering, the mokka and laurina characters, yellow ("wax") seeds, and calycanthemy. No case of linkage has yet been observed. In *C. canephora* yellow fruit colour, fasciation and dwarf habit are all recessive, though the corresponding characters in *C. arabica* are dominant. In triploid interspecific hybrids of *C. arabica*, the fasciation gene of *C. canephora* is recessive while that from *C. arabica* is dominant; in tetraploid hybrids of the same cross, where probably two *C. canephora* genomes are present, the fasciation gene from *C. arabica* is only partially dominant. The dwarf gene from *C. canephora* remains dominant in triploid hybrids with *C. arabica* but when combined with the *nana* gene from that species gives rise to the murta type. The mokka gene, almost recessive in *C. arabica*, is partially dominant in triploid hybrids with *C. canephora*. The factors *erecta* and *calycanthema*, both dominant in *C. arabica*, remain so in hybrids with tetraploid *C. excelsa*. *C. arabica* is thought to be an allopolyploid, *C. canephora* being suggested as one of the possible parents.



No inbreeding depression or heterosis has been observed in crosses within or between species, with the possible exception of the hybrid Bourbon x Maragogipe, which seems to give increased yields. The Bourbon variety is thought to have been derived from the variety Mokka by means of two dominant mutations.

307.

633.73.00.15(81)

A supressão do Instituto de Café do E. de São Paulo e a sua significação.  
(**The suppression of the Coffee Institute of the State of São Paulo and its significance**).

Rev. Dep. Nac. Café, Rio de J. 1944 : 22 : 792-94.

The reasons, mainly financial, for closing the coffee institute are outlined. Questions concerning labour, marketing, etc., will in future be the concern of a new Board of Economic and Financial Studies (Gabinete de Estudos Econômicos e Financeiros).

## CONDIMENTS 633.84

308.

LANTZ, E. M.

633.842:577.16

**The carotene and ascorbic acid contents of peppers.**

Bull. N. Mex. Agric. Exp. Sta. 1943 : No. 306 : Pp. 14.

An account is given of the carotene and ascorbic acid contents of pepper (*Capsicum annuum*) varieties.

## OIL PLANTS 633.85

309.

ANDRÉ, É. and

KOGANS-CHARLES, M.

633.853.49:581.6(44)

Sur quelques caractères chimiques des graines de colza utilisables en vue de sélectionner les meilleures variétés. (**Some chemical characters of colza seeds that can be utilized with a view to selecting better varieties**).

C.R. Acad. Sci. Paris 1942 : 215 : 587-88.

It is believed that colza varieties differ significantly in the yield and chemical composition of the oil. An account is given of some of the more promising types.

310.

LANGHAM, D. G.

633.853.74:581.45:575-184

Variación en el número de hojas, cápsulas e hileras de semillas por nudo en el ajonjolí (*Sesumum indicum* Loew). (**Variation in the number of leaves, capsules and seed rows, per node, in *S. indicum*, Loew**).

Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1944 : No. 6 : Pp. 4.

Plants with three leaves per node instead of two have been found in all varieties studied. They were more frequent in varieties with eight rows of seeds per capsule but they all gave rise to normal plants in succeeding generations.

311.

MERRILL, S. (JUN.)

633.854.56:581.165.711

**The budding of tung (*Aleurites fordii* Hemsl.).**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 227-35.

Varietal differences are reported in the performance of tung rootstocks.

312.

BLARINGHEM, L.

633.854.78:575.115:575.183

Sur un cas nouveau de xénie chez le tournesol. (**A new case of xenia in the sunflower**).

C.R. Acad. Sci. Paris 1942 : 215 : 337-39.

It has been found that formation of single-headed phenotypes is a dominant character in some sunflower lines but recessive in others. A tendency towards the production of double achenes has also been investigated and shown to have a genetical basis. Xenia is reported in the case of natural crossing between a light seeded plant and a presumed black seeded parent; a small group of achenes in the female parent were seen to have the black ovary wall characteristic of the presumed pollen parent.

313.

BUCHINGER, A.

633.854.797:575(43)

Erfahrungen im Saffloranbau. (**Experiences in safflower cultivation**).

Mitt. Landw. 1944 : 59 : 334-35.

Details are given of the plant and its cultivation. The aims in breeding are increased yield, higher oil content, the production of a spineless type and a reduction in the proportion of husk.

R. M. I.

314.

633.854.797:581.6

**More oil in new safflower strains.**

Sth. Seedsman 1944 : 7 : No. 7 : p. 31.

Safflower strains have been developed, whose seeds yield up to 34% of oil.

**MEDICINAL PLANTS 633.88**

315.

MADUEÑO BOX, M.

633.88:575(46)

Contribuciones al estudio de plantas medicinales productoras de alcaloides.

**(Contributions towards the study of medicinal plants producing alkaloids).**

Bol. Inst. Inwest. Agron. Madr. 1944 : No. 10 : 137-76.

Comparisons were made between *Atropa Belladonna* L. and *A. baetica* Wlk.; the latter species was more difficult to grow and gave lower yields than the former; its total alkaloid content was somewhat higher but its biological effects were less pronounced and less prolonged. Apparently *l*-hyoscyamine is converted to atropine less rapidly in *A. Belladonna* than in *A. baetica*. The effect of various methods of cultivation on the yield and quality of *Datura Stramonium* was also studied.

316.

BREWER, W. R. and

LAURIE, A.

633.88:576.356.5:581.04:581.6

**Culture studies of the drug plant *Atropa belladonna*.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 511-17.

Colchicine treatment of *A. Belladonna* does not markedly affect the alkaloid content and causes a slight decrease in yield.

317.

CARVALHO, A. and

KRUG, C. A.

633.885.1:575(81)

A quineira (*Cinchona* sp.)—origem, classificação, exploração econômica no mundo e tentativas de sua aclimação no Brasil. **(Cinchona, its origin, classification, economic utilization in the world, and attempts at acclimatizing it in Brazil).**

Instituto Agron. Campinas, S. Paulo 1944 : Pp. 141.

Since 1938 a vigorous campaign to acclimatize cinchona in Brazil has been in progress, and a special experimental station was founded for the purpose in that year. The present bulletin gives a general description of the plant, including an historical account of its utilization and of the various expeditions sent to the Andes in quest of it, a botanical description of the genus and its species, with a key for their identification and a brief statement regarding their geographical distribution. There follows an account of the cultivation of cinchona in different parts of the world, including a brief outline of the breeding work in the Netherlands East Indies and elsewhere, based on the published literature; it is pointed out that the efficiency of the Java breeding work has been the principal factor leading to the decline of the industry in Ceylon and elsewhere. The first stage in the programme of the new experimental station in Brazil was to send an expedition to Bolivia, Peru, Ecuador and Colombia, where seed of many species was collected. Further material has been obtained from experiment stations in different parts of the world. The most interesting forms will be grown in different localities in the state of S. Paulo. Taxonomic and cytological studies have been made on the material, the chromosome number  $2n = 34$  having been established for *C. Ledgeriana*, *C. Calisaya vera* and *C. lucumaeifolia*. Colchicine is being used in an attempt to induce chromosome duplication. Selection and hybridization work is about to begin.

318.

PFEIFFER, N. E.

633.885.1:581.331.2:578.08

**Prolonging the life of *Cinchona* pollen by storage under controlled conditions of temperature and humidity.**

Contr. Boyce Thompson Inst. 1944 : 13 : 281-93.

*Cinchona* pollen may remain viable for a year if stored at 10° C. with a relative humidity of 35-50% in darkness. Reduced pressure is disadvantageous. Pollen from long-styled flowers survives best.



319. FISCHER, A. F. 633.885.1-1.524(73)  
**Growing cinchona under American control.**

Torrey 1944 : 44 : 1-5.

The breeding of cinchona for high alkaloid content and better adaptability to unfavourable environmental conditions is urged. It is hoped that the surveys now being made of Central and South American species will result in the discovery of valuable breeding material; plants growing at an elevation of 10,500 feet in Ecuador and Bolivia have been reported.

# RUBBER PLANTS 633.91

320. DUCKE, A. 633.912:582(81)

Novas contribuições para o conhecimento das seringueiras ("Hevea") da Amazônia brasileira. (Further contributions towards the knowledge concerning the *Hevea* species of Brazilian Amazonia).

Arq. Serv. Florestal, Rio de Janeiro 1943 : 2 : 25-43.

A renewed study of the *Hevea* species of the Brazilian forests in their native habitat has revealed the presence of certain hybrids of *H. brasiliensis* x *H. Spruceana* growing vigorously on poor, acid soils where pure *H. brasiliensis* does not thrive. Amongst several thousand trees of *H. Spruceana* observed, one hybrid of *H. Benthamina* x *H. Spruceana* was found, bearing mature capsules. A second specimen of *H. gracilis* (*H. Benthamina* x *H. guianensis marginata*) was found in Manaus.

Descriptions are given of the species and varieties found, with indications of the local names applied to them, and of their geographical distribution. The new observations have shown the area of distribution of *H. brasiliensis* to be considerably greater than was formerly supposed. The three other important species are *H. Benthamina*, *H. lutea* and *H. guianensis*; the two latter may prove to be only varieties of a single species.

The hybrids are also described.

321. LANGFORD, M. H. 633.912-2.421.9-1.521.6:575(73)

**Science's fight for healthy Hevea.**

Agric. Amer. 1944 : 4 : 151-53, 158.

An account is given of the progress made in tropical America towards the development of *Hevea* varieties resistant to South American leaf blight.

322. STEBBINS, G. L. (JUN.) and KODANI, M. 633.913:576.312.35

**Chromosomal variation in guayule and mariola.**

J. Hered. 1944 : 35 : 163-72.

The following diploid chromosome numbers, 36, 38, 54, 58, 72, 74 and 108-111, have been found in *Parthenium argentatum*, and 54, 72 and 90 in *P. incanum*. It is believed that the basic chromosome number of the two species is  $x = 9$ . The plants with 108-111 chromosomes appear frequently in the progenies of 72 and 74 chromosome strains and are autotriploids. A haploid 36-chromosome plant has been found in the offspring of a 72-chromosome individual and exhibited a high degree of meiotic irregularity in contrast to the more regular meioses of the wild 36 and 38 chromosome strains.

Higher polyploids show many meiotic irregularities, a state of affairs resulting in reduced fertility. Introgressive hybridization of *P. incanum* with *P. argentatum* has also occurred.

323. MOLOTKOVSKY, G. K. 633.913:581.165

**On the vegetative propagation of the rubber plants kok-saghyz, tau-saghyz and krym-saghyz.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1943 : 40 : 291-93.

A note is given on the efficiency of regeneration of root cuttings of these rubber plants. Krym-saghyz forms roots the most readily, kok-saghyz does so less readily and tau-saghyz only with difficulty.

324. BALANDIN, D. A. and KOLESNIKOV, B. P. 633.917:581.16

**(The content of guttapercha in the species of *Euonymus* in the Maritime Province).**

Sovetskaja Botanika (Soviet Botany) 1943 : No. 4 : 42-54.

The five species found growing in this Province (in the Far Eastern U.S.S.R.) and examined in

this article are: *Euonymus alata* Thunb., *E. pauciflora* Maxim., *E. macroptera* Rupr., *E. sachalinensis* Maxim., and *E. Maackii* Rupr. The species *E. pauciflora* and *E. macroptera* are the most widely distributed, while *E. sachalinensis* and *E. Maackii* are the most restricted of all the five species, each of which, however, is confined to its own altitude. Among these species guttapercha is found in largest amount in *E. Maackii*, which is equal in this respect to *E. verrucosa*, a species from which most of the guttapercha in other parts of the U.S.S.R. has been obtained hitherto. *E. alata* is also fairly rich in this substance, but the content in the other species is low. Relationship between the species is not a sure guide in the determination of guttapercha content. *E. paucifolia*, for example, though more closely related to *E. verrucosa* than is *E. Maackii*, contains much less guttapercha than the latter. I. Z.

## FRUITS 634

325. SWANSON, C. P. and GARDNER, V. R. 634.11:575.247:576.312.35  
**A pomological and cytological study of a russeted sport of the Stark apple.**  
 J. Agric. Res. 1944 : 68 : 307-15.

A russet bud sport of the variety Stark is described. It has 51 diploid chromosomes in contrast to the 42 chromosomes of the parent strain. Branches exhibiting partial or complete reversion to the original type were produced by the sport, the chromosome numbers being 46 and 42 respectively. The mechanism of the changes in chromosome number are discussed, including the possibilities of somatic non-disjunction and somatic segregation of a chromosomal chimaera.

326. GARDNER, V. R. 634.11:575.255  
**A study of the Sweet-and-Sour apple chimera and its clonal significance.**  
 J. Agric. Res. 1944 : 68 : 383-94.

The name Sweet-and-Sour applies to a type of variety rather than to any particular variety since the plants so-called have been derived from a number of different forms. Sweet and sour regions in the fruit are arranged in a complex pattern, best regarded as a mericlinal or mosaic chimaera.

327. W....., H. 634.11:575.3(49.4)  
 Von der Sortenwahl unter besonderer Berücksichtigung zürcherischer Verhältnisse. (On selection of varieties with special reference to Zürich conditions).  
 Schweiz Z. Obst- u. Weinbau 1944 : 53 : 152-56.

The need for reducing the number of varieties of apples planted by individual growers in the canton of Zürich and care in the choice of varieties suited to the region are discussed.

328. FISH, V. B., DUSTMAN, R. B. and MARSH, R. S. 634.11:577.16(75.4)  
**The ascorbic acid content of several varieties of apples grown in West Virginia.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 196-200.

Varietal differences in the ascorbic acid content of West Virginian apples are reported.

329. McMUNN, R. L. 634.11:581.162.52  
**The Red Bird apple self-unfruitful.**  
 News Lett. Ill. St. Hort. Soc. 1944 : No. 3 : 3-4.

The variety Red Bird appears to be self-sterile; satisfactory pollinators are mentioned.

330. BRADFORD, F. C. 634.11:581.165.711  
**Second-year changes in apparent vigor of apple varieties of prospective value as trunk-formers.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 215-20.

A comparison of American and European (including Russian) apple stocks has been made, and the possibility of judging these from the performance of two-year-old specimens is discussed.



331. SHAW, J. K. and  
SOUTHWICK, L. 634.11:581.165.711  
**Certain stock-scion incompatibilities and uncongenialities in the apple.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 239-46.

The terms stock-scion incompatibility and uncongeniality are defined and the causes of such occurrences analysed.

332. SUDDS, R. H. 634.11:581.165.711  
**The effect of the rootstocks on ten years' growth and yield of the Gallia Beauty apple.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 236-38.

Details are presented of the performance of Gallia Beauty on seventeen different rootstocks.

333. WELLINGTON, R. and  
HOWE, G. H. 634.11:581.6:575.11  
**The performance of seedlings derived from selfing and crossing the McIntosh apple.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 273-79.

An account is given of genetics of selfed McIntosh and crosses between McIntosh and triploid and other diploid varieties. The characters investigated include vigour, ripening time, fruit size, fruit shape, skin colour and texture, and coarseness, toughness, colour, flavour and quality of the flesh. Most of these characters appear to be determined by multiple factors.

334. HOUGH, L. F. 634.11-2.421.9-1.521.6:575.11  
**A survey of the scab resistance of the foliage on seedlings in selected apple progenies.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 260-72.

An account is given of the degree of scab resistance exhibited by orchard apple varieties and also by other species of *Malus*. Duchess and Jefferis are among the more promising cultivated varieties while *M. floribunda* and *M. atrosanguinea* are very resistant. In general, scab resistance appears to be inherited polymerically although a 1 : 1 segregation of resistant and susceptible offspring was obtained in the  $F_2$  generation of the cross Rome Beauty  $\times$  *M. floribunda*. Differences in the behaviour of reciprocal crosses may indicate the action of cytoplasmic factors.

335. GRAVES, G. 634.22:575(73)  
**The beach plum, its written record.**

Nat. Hort. Mag. 1944 : 23 : 73-97.

A comprehensive review of the literature relating to *Prunus maritima* Marsh., the beach plum, is presented. After a preliminary account of the taxonomy and nomenclatural problems of the species, an account is given of the natural variation and the cultivated varieties of the species. Interspecific hybridization between this and closely allied species has been effected by plant breeders.

336. SOUTHWICK, L. and  
FRENCH, A. P. 634.22:582:001.4  
**The identification of plum varieties from non-bearing trees.**

Bull. Mass. Agric. Exp. Sta. 1944 : No. 413 : Pp. 51.

Figures and descriptions are given of the vegetative parts of 57 plum varieties grown in the northern U.S.A. Various points of nomenclature are discussed and there is a key to the varieties included.

337. ZOBRIST, L.,  
CONRAD, R.,  
ZOGG, H. and  
MAAG, R. 634.23-2.483-1.521.6  
**Untersuchungen über die *Gloeosporium*-Fruchtfäule an Kirschen. (Investigations on *Gloeosporium* fruit rot in cherries).**

Schweiz. Z. Obst- u. Weinbau 1944 : 53 : 161-69.

The question of varietal differences in resistance to *G. fructigenum* is touched upon; in general hard fleshed cherries, e.g. Späte Basler [Late Basel], are less susceptible.

338. BLAKE, M. A. 634.25:581.144  
**Classification of fruit bud development on peaches and nectarines and its significance in cultural practice.**  
 Bull. N.J. Agric. Exp. Sta. 1943 : No. 706 : Pp. 24.

Observations on the mode of development of the fruit buds are reported for peach and nectarine varieties.

339. CONDIT, I. J. 634.37:582:001.4  
**San Piero, the Brown Turkey fig of California.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 211-14.

An account of the history and synonymy of the Californian Brown Turkey fig is presented. The name Brown Turkey applies also to two other varieties, one English and the other grown in the south-eastern U.S.A. The Californian variety was described in 1820 by Gallesio under its Italian name, San Piero. Other synonyms include Negro Largo and San Pedro Black.

340. BAILEY, L. H. 634.6:582:001.4  
**Revisio Palmettorum. Revision of the American palmettoes.**  
 Gentes Herbarum, Ithaca, N.Y. 1944 : 6 : 367-459.

A monographic account is presented of the genera *Seneroa* Hook. and *Sabal* Adanson. The following new species of the latter genus have been founded: *S. peregrina*, *S. viatoris*, *S. bahamensis*, *S. yucatanica* and *S. Questeliana*.

341. 634.651:577.8  
 ADDISON, G. 634.651:575.127.2  
 Sexo em mamão (*Carica papaya* L.). [Sex in papaya (*C. papaya* L.)].  
 Rev. Agric. Piracicaba 1943 : 18 : 448-49.

Detailed observations on the development of the pollen and ovules and the germination of the seeds have given no indications of zygote elimination such as has been assumed by Hofmeyr for the homozygous dominants.

Parthenocarpy was observed in certain plants. Crosses have been made between *C. Papaya* and *C. monoica*, which also has  $n = 9$ . A certain number of fruits were obtained but the embryo in the seeds failed to develop.

342. SCHROEDER, C. A. 634.653:581.481  
**Multiple embryos in the avocado.**  
 J. Hered. 1944 : 35 : 209-10.

Examples of polyembryony in the avocado are described.

343. DARROW, G. M. and 634.711:575(71.5)  
 CLARK, J. H.  
**The Sunrise red raspberry.**  
 Circ. N.J. Agric. Exp. Sta. 1939 : No. 397 : Pp. 4.

The new variety Sunrise originated as a selection from the cross Latham x Ranere. It combines earliness, hardiness and disease resistance with superior fruit quality.

344. SLATE, G. L. and 634.711:575"793"  
 SUIT, R. F. 634.711-2.421.1-1.521.6  
**A second report on the breeding of autumn-fruiting red raspberries.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 283-88.

Difficulty has been experienced in the attempt to produce superior autumn fruiting raspberries by hybridization. The mode of inheritance of the autumn fruiting habit is unknown and this character tends to be lost when crossed with early fruiting forms. Mating closely related lines leads to a decrease in vigour and several hybrid progenies have shown unexpected severe susceptibility to powdery mildew. Female sterility is found in some of the seedlings derived from Ranere.

345. MURRILL, W. A. 634.715:575.115.061.6  
**More about white blackberries.**  
 Science 1944 : 99 : 513-14.

Black fruits only have been obtained from 104 seedlings derived from the white fruited variety *albifructus*. This may be because the white fruited forms were pollinated by pollen from the dominant black variety.



346. ANDERSON, J. P. 634.72:575.127.2(79.8)  
**Two notable plant hybrids from Alaska.**

Proc. Iowa Acad. Sci. 1943 : 50 : 155-57.

After dealing with a *Ranunculus* hybrid, the author describes a naturally occurring and sterile hybrid of *Ribes bracteosum* Dougl. x *R. laxiflorum* Pursh.

347. DARROW, G. M.,  
 WILCOX, R. B. and  
 BECKWITH, C. S. 634.73(73)  
**Blueberry growing.**

Fmrs' Bull. U.S. Dep. Agric. 1944 : No. 1951 : Pp. 38.

This bulletin includes descriptions of the more important American blueberry varieties.

348. DARROW, G. M.,  
 CAMP, W. H.,  
 FISCHER, H. E. and  
 DERMEN, H. 634.73:576.312.35  
**Chromosome numbers in *Vaccinium* and related groups.**

Bull. Torrey Bot. Cl. 1944 : 71 : 498-506.

Chromosome numbers are given for the following species of *Vaccinium* and allied genera: (1) diploid species ( $2n = 24$ ), *V. angustifolium* Ait., *V. atrococcum* (Gray) Heller, *V. caesariense* Mackenzie, *V. myrtilloides* Michx., *V. Darrowi* Camp, *V. Elliotii* Chapman, *V. Margarettae* Ashe, *V. pallidum* Ait., *V. tenellum* Ait., *V. crassifolium* Andr., *V. ovatum* Pursh, *V. parvifolium* Sm., *V. Vitis-Idaea* L., *V. uliginosum* L. (also tetraploid), *Oxycoccus macrocarpus* (Ait.) Pers., *O. microcarpus* Turcz. and *Polycodium stamineum* (L.) Greene; (2) tetraploid species ( $2n = 48$ ), *V. Lamarckii* Camp, *V. australe* Small, *V. Brittonii* Porter, *V. corymbosum* L., *V. hirsutum* Buckley, *V. Myrsinites* Lam., *V. simulatum* Small, *V. Tallapusae* Uphof, *V. virgatum* Ait., *V. uliginosum* L. (also diploid), *V. Arctostaphylos* L., *Oxycoccus ovalifolius* (Michx) Porsild and *O. quadripetalus* Gilib.; and (3) hexaploid ( $2n = 72$ ), *V. Constablei* Gray, *V. amoenum* Ait., *V. Ashei* Reade and "*Oxycoccus gigas*" Hagerup. Triploids are unknown but pentaploids occur naturally and have been obtained by artificial hybridization. The higher polyploids apparently include both autopolyploids and allopolyploids.

349. ČAJLACHJAN, M. C. 634.74:577.16:581.9(56.6)  
**Content of vitamin C in wild roses of Armenia.**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1943 : 40 : 369-71.

The results of an investigation into the ascorbic acid content of Armenian rose hips are reported. Two groups of species are recognized, a class widely distributed through Armenia with a vitamin content of 300-2000 mg.% and a smaller class confined to the central highlands in which the vitamin content is always above 1000 mg.% and may exceed 3000 mg.% as in *Rosa Boissieri*. These findings are held to refute Bukin's generalization that the roses of Southern latitudes have a low ascorbic acid content.

A correlation has been observed between high vitamin content and the presence of coloured succulent and upturned sepals at early maturity.

350. 634.774:575(81)  
**Brazil developing new pineapple varieties.**  
 Agric. Amer. 1944 : 4 : p. 137.

Pineapple breeding is in progress in Brazil, one of the objectives being to produce a thornless variety.

## VITICULTURE 634.8

351. SCHELLENBERG, H. 634.835:575.12  
 Der Riesling x Sylvaner. (The Riesling x Sylvaner hybrid).  
 Schweiz Z. Obst- u. Weinbau 1944 : 53 : 24-32.

The origin and history of this hybrid vine, its performance and value form the subject of this paper.

352. COWART, F. F. and  
 SAVAGE, E. F. 634.835:581.165.711  
**An evaluation of certain grape varieties for use as rootstocks.**  
 Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 315-18.

Varietal differences in the performance of grape rootstocks are reported.

353. \*GRAČANIN, M. 634.835:581.165.711:575.12(49.7)  
 Da li je propadanje loze na podlozi Aramon x Rupestris Ganzin 1 edafski  
 uvjetovano. (**Is the degeneration of the vines grafted on Aramon x  
 Rupestris Ganzin 1 edaphically conditioned**).  
 Arhiv Minist. Poljopr. 1939 : 6 : No. 15 : 3-26.

The properties of the hybrid Aramon x Rupestris Ganzin 1, which was raised by the French breeder V. Ganzin in 1879, the seed parent being Aramon and the pollen parent Rupestris, are discussed; it is usually regarded as being confined to warm climates, but has been successfully introduced into the warmer parts of certain cold countries, e.g. in Austria and Germany. It is not entirely immune to *Phylloxera*, but is tolerably resistant under certain conditions of climate and soil.

The question of the occurrence of degeneration in Aramon x Rupestris Ganzin 1 needs careful study. It is considered probable however since in Switzerland, Austria and Germany the younger plants are the least resistant.

354. SNYDER, E. and 634.835:581.6  
 HARMON, F. N.  
**Drying different vinifera grape varieties for raisins.**  
 Proc. Amer. Soc. Hort. Soc. 1944 : 44 : 201-04.

A comparison has been made of raisin, table and wine varieties of grapes with regard to their suitability for drying.

355. VITOLOVIĆ, V. 634.835-1.524(49.7)  
 Ispitivanje sorata vinove loze u kalničkokoževačkom vinogorju. (**Testing  
 the vine varieties in the Kalnik vineyard regions of Western Croatia**).  
 Arhiv Minist. Poljopr. 1939 : 6 : 69-79.

The properties of the musts and wines made from different Yugoslavian vine varieties were investigated and the results are here reported in full. The study was made more difficult by the frequency of synonyms and homonyms. The sugar content was estimated in 465 samples and the acid content in 385. The highest sugar content was found in the variety Bouvier-ova ranina, with 22.5%, and the lowest in Zelenika, with 11.6%. The acidity was 0.68° in Ružica and 1.39° in Stara Belina. Great variations were observed however in the values of one and the same variety in different years. Many varieties with satisfactory sugar contents were nevertheless unsuitable for wine making on account of their excessive acidity. The five best varieties for white table wine were found to be Kraljevina, Klešćec, Slatki Zelenec, Taljanska Graševina and Semijon. Certain other varieties are recommended for white wine of the next quality and for red wine, Frankovka, Portugizac [Portugieser], Kosovina and Pinot Crni [Pinot Noir]. Brief notes are given concerning the characteristics of each of these varieties and the conditions for which each is suitable.

#### FORESTRY 634.9

356. 634.97:575(48.5)  
 Ordinarie årsmöte med Föreningen för växtförädling av skogsträd. (**Ordinary  
 meeting of Association for Forest Tree Breeding**).  
 Svensk PappTidn. 1944 : 47 : p. 107.

This is a brief report on the aims and work of the Association and a lecture by Enar Andersson on the Värmland and Norrland branch stations (cf. Annual reports reviewed in "Plant Breeding Abstracts").

357. \*SYLVÉN, N. 634.97:575(48.5)  
 Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet  
 under år 1943. (**Annual report on the work of the Association for  
 Forest Tree Breeding during the year 1943**).  
 Svensk PappTidn. 1944 : 47 : No. 6 : Pp. 38.

In addition to the usual information regarding staff, meetings, membership, co-operation with official and other bodies, work on surveys, seed collection, etc., an account of the work of the main institute on coniferous trees is presented by C. L. Kiellunder while H. Johnson reports on deciduous trees.

\* An extended summary of this paper is on file at the Bureau.



## Spruce

An account is given of the way the seedlings from the 1941, 1942 and 1943 seed harvests from different mother trees and élite stands were utilized. From the spruce crosses in élite stands at Boserup in Scania (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 1004), 1000 plants have been obtained that are of great interest, being hybrids between trees of different extreme types of branching. Selection for hardy fast growing types of Swedish and German spruce has been carried out in the Association's low temperature laboratory, in which a temperature of  $-50^{\circ}\text{C}$ . can be obtained.

In chromosome determinations made from the 1941 treatments of germinating spruce seed with colchicine, 48-chromosome nuclei have been found, which suggests that the first tetraploid spruce has been produced. In the 1942 material two types were found, one (about 90% of the plants) apparently unaffected with higher increment and normal, relatively long and narrow lightish green needles; and the other type, either completely or partially affected, with the longitudinal growth reduced at first, but with more or less pronounced shortening and thickening of the needles which were dark green. The morphology of these two types has been studied and the chromosome number is to be determined in 1944.

## Pine

From the 1941 seed at Ekebo, 24,200 plants were set out in field experiments. Seed from two élite pines at Woxna was taken for colchicine treatment in spring 1944. In spring, seed was sown from a number of genetically interesting pines from Uppland and from some high grade mother trees of practical interest from Woxna.

## Larch

A larch survey is in progress. Larch breeding operations aim at providing not only first class races of the pure species but also at species hybrids that will be exceptionally vigorous in rate of increment and volume yield. For the latter purpose two special seed plots have been laid down, one to obtain Japanese  $\times$  European hybrids and the other, Japanese  $\times$  Siberian.

Species crosses of larch were also made in 1941 at Grensholm and Svalöf and in 1942 at Ekebo. The crosses at Ekebo, made with young trees in wooden tubs, resulted in 1943 in 350 plants representing different combinations of European, Siberian and Japanese larch; in Scania scarcely any larches flowered, but in Östergötland (Grensholm) crosses were made again in 1943 between specially chosen mother trees of the different species.

New mother trees of larch were chosen during the year in Dalarna, Värmland, Östergötland and Scania and some trees of *L. sibirica* (Raivola type), *L. Gmelini* (= *L. dahurica*) and *L. decidua* were also put at the Association's disposal.

## Other conifers

Investigations are proceeding to discover whether there are or can be produced races of foreign conifers superior in some respect to the indigenous species. More plantations have been established from North American seed. The species most worth cultivating, besides larch, seem to be the Sitka spruce (*Picea sitchensis*) and Douglas fir (*Pseudotsuga Douglasii*).

C. Eklundh has reported on earlier crosses between different species of conifers (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 964). Seed of several different species after crossing and leaving the flowers unprotected to complete their development at Kiviks-Esperöd and after open pollination at Draffe was sown in the greenhouse at Ekebo, where seed of four trees of *Pseudotsuga taxifolia viridis* (from Grensholm) that had shown the greatest hardiness in the three previous severe winters was also sown.

## Aspen and Poplar

A hybrid aspen from a cross between *Populus tremuloides* and Swedish aspen is a fast growing type resistant to leaf diseases. Some pure aspen crosses were made with high quality trees. Two 57-chromosome giant aspens were found in southern Sweden. Formerly female giant aspens had been found in relatively few localities. The giant aspens at Älskult include only a few trees; they are 80-90 years old and the largest trunks measure over 70 cm. in breast height diameter and their height exceeds 30 m. Also several are quite uninjured by stem rot.

The first 76-chromosome aspen produced by H. Nilsson-Ehle produced flower buds for the first time in relatively large numbers in grafts at Ramlösa, strangled or otherwise treated to induce flowering, and also in similar experiments at Ekebo. Hence giant aspens can be produced on a large scale in spring 1944 by crossing 76-chromosome aspens with trees with the normal chromosome number.

The varieties in the comparative trials are now beginning to give valuable data on the different crosses; among the superior seedlings are hybrids from crosses between white poplar (Silverpoppel) and aspen. Crossings of this type are in general vigorous but extremely sensitive to some fungous diseases. A few have, however, proved unusually resistant as well as having outstanding growth characters.

### **Birch**

In comparative field experiments with birch, 23,440 plants belonging to nearly 200 different families were planted out at Kolleberga. At the main institute an experiment was laid out to compare different families derived from trees with curly grained wood and another to compare different very vigorous interspecific hybrids and their parents.

In 1944 there were 38,670 plants ready for planting out, comprising 11,350 plants from families undergoing selection, 10,405 from 1941 crosses and 16,915 from 1942 crosses. Among these plants were about 8000 from a cross between curly grain birches.

In spite of sparse flowering numerous birch crosses were made in the greenhouse, including interspecific crosses, for some such hybrids are exceptionally fast growing.

Among the valuable birches found in natural stands was an extreme curly birch type found at Stockby and a vigorous, large leafed triploid found at Edsbyn.

### **Oak**

Progeny trials are in progress. Selections of mother trees have been made. Results of the work on leaf coloration and leaf fall in relation to hardiness have been published (cf. Abst. 361 below). The Tannin Company (Atiebolaget Tannin) has given a grant of 10,000 kronor for oak breeding. Some new mother trees have been chosen.

### **Alder**

Photoperiodism was further studied in 1943.

Crosses were made with the bottle grafts, grown in the illuminated greenhouse, of *A. glutinosa* with *A. cordata*, *A. incana* and *A. rubra* and of *A. subcordata* with *A. glutinosa* and *A. cordata*. Some fruits were obtained.

Colchicine was used on one and two year old alders grown in pots. Investigation of the stomata and chromosome number in these supposedly mixoploid plants showed that the root tip cells were predominantly diploid, whereas the variation in the size of the stomata suggested that the shoot system had retained its mixoploid character to a greater extent. It is hoped, by means of vegetative multiplication, to obtain pure tetraploids from some of the buds of these colchicine treated plants.

### **Ash**

Some crosses were made on the bottle grafts, which flowered abundantly, but seed can scarcely be expected until the second or third year.

### **Elm**

The Kärnbogårde elm with triploid progeny (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 1004) was bottle-grafted on a large scale, then crossed with the ordinary diploid, and about 100 plants were obtained, all triploids. A second elm, producing diploid pollen and thus triploid progeny on crossing with the normal elm, was found near the first specimen. On crossing these two special elms very little seed was obtained and none germinated. The attempt will be repeated in 1944. A field experiment with elm was laid down with species crosses and varietal crosses from 1941 plants. Determinations were made of chromosome number and stomatal size of the hybrids to study polyploidy and the gamete formation.

### **Cytological and Chemical Laboratories**

In the chromosome laboratory a considerable proportion of the 831 specimens dealt with were of colchicine treated spruce, though some were of similarly treated deciduous trees, especially elm. Investigations were also made of triploid progeny of elm and hybrid progeny of birch and aspen. Fourteen new tetraploid aspens were discovered in 1943 among the progeny from crosses between male giant aspen crossed with normal aspens from Ransäter in Värmland and Trua in Västergötland.

As the relationship between the timber of young and older trees from the standpoint of their chemical constitution is also of interest to the breeder, work has been started on this problem with cellulose, resin and lignin determinations in wood from the stem and terminal shoots in older trees and root shoots and young cuttings of the same trees, aspen or poplar being the species used.

Reports by directors of the various affiliated branch stations are also cited.



358. SYLVÉN, N. 634.97:575(48.5)  
Föreningen för växtförädling av skogsträd. Styrelseberättelse för år 1943.  
(**The Association for Forest Tree Breeding : Report of the Board for 1943**).

Svensk PappTidn. 1944 : 47 : 104-06.

This report on the activities and financial and economic position of the Association includes an account of various ways in which its work and facilities (e.g. staff, new buildings, and sub-stations, acquisition of land, equipment, etc.) have been extended at the various centres, such as Ekebo and Brunsberg, where research is in progress. Much financial and other support from various official, commercial and other bodies interested in the development of forest tree breeding is acknowledged.

At Ekebo some new comparative progeny tests were planted out on new ground and plantings of larch species to obtain hybrid seed were also made; they included crosses of Japanese x European and Japanese x Siberian species.

359. TIRÉN, L. 634.97:581.145.2(48.5)  
Skogsträdens Fruktläggning år 1943. (**Set of fruit of forest trees in the year 1943**).

Flygblad 1943 : No. 57 : Pp. 12.

Officially organized returns of the amount of flowering (male and female inflorescences) and fruiting in Swedish pine, spruce, birch, oak and beech trees are presented in the form of maps and tables showing separately the regions and species.

360. JOHANSON, Å. 634.972.1:581.143.26.035.1:575.3(48.5)  
Eken. Trollväsens och Vasakungs skötebarn. (**The oak. The trolls' and Vasaking's favourite**).  
Skogsägaren 1944 : 20 : 169-72.

A popular note, from the historical aspect, on the oak in Sweden and on various famous specimens, some of which are mentioned in the legends of the country. Efforts have been made to find a type of oak that will flourish north of the Dal. A species with the shortest possible vegetation period is needed. It seems possible that many varieties exist from which, after further experiments, a suitable type could be chosen.

361. SYLVÉN, N. 634.972.1-2.111-1.521.6:581.43(48.5)  
Om ekens lövspricknings- och lövfällningsdata. Ett bidrag till kännedomen om ekens mångformighet. (**On the dates of leaf emergence and leaf fall in the oak. A contribution to the knowledge of the diversity of the oak**).  
Svensk PappTidn. 1944 : 47 : 167-74.

Further investigations (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 957 and XIV, Abst. 1004) are reported from Sweden on the relation between hardiness and early or late autumn colouring and leaf fall; the study has been extended to include observations on the time of coming into leaf. The present detailed report deals with investigations with 480 oaks. Analysis of the results showed:—

Changes in the seasonal type of a particular tree were inconsiderable, only 5 out of 469 specimens exhibiting variable behaviour in coming into leaf and only 10 out of 408, variability in the time of leaf fall. There was however considerable variation as regards the correspondence between earliness type in the spring and leaf fall type in the autumn. Oaks that are early in spring and late in autumn are in general susceptible to autumn frosts and therefore unsuited to northern latitudes; whereas those which are late in spring but early in autumn, requiring a short vegetation period, are better adapted to cultivation in northerly regions, which has been borne out by freezing experiments in spring and autumn at Ekebo. For transfer to northern latitudes trees late in coming into leaf but relatively early in assuming autumn colouring and in shedding their leaves seem specially valuable.

362. WETTSTEIN, W. V. 634.972.3:576.356.5:581.04:575  
581.143.26.035.1:634.972.3  
Züchtung von Cellulosepflanzen. (**Breeding cellulose plants**).  
Der Papier-Fabrikant 1943 : No. 2 : 54-57.

Several breeding techniques have been used to improve the cellulose yield and fibre quality of poplars. Selection, heterosis, transgressive breeding and induced polyploidy are all of value and it is reported that tetraploid poplars have been obtained by the colchicine technique. It is important to develop varieties adapted to the photoperiodic conditions under which they are to be grown.

363. BRAY, M. W. and  
PAUL, B. H. 634.972.3:581.6:575.127.2  
**Pulping studies on selected hybrid poplars.**  
Paper Tr. J. 1942 : 115 (16) : 33-38.

A comparison has been made between the pulping quality of *P. tremuloides* and various hybrid poplars. The growth rate of the hybrids was found to be much greater and the pulp strength greater, but the pulp yields per unit weight of wood were lower and the bleaching requirements greater. Difficulty was experienced in the interpretation of the experimental data owing to the quality differences that occur along the length of a single tree.

364. SCHEFFER, T. C.,  
LACHMUND, H. G. and  
HOPP, H. 634.973:581.6  
**Relation between hot-water extractives and decay resistance of black locust wood.**  
J. Agric. Res. 1944 : 68 : 415-26.

Varieties of *Robinia pseudoacacia* L. differ *inter se* in the resistance of the heart-wood to decay. These differences are correlated with the content of water soluble substances toxic to fungi.

365. FASSETT, N. C. 634.975:575.12(73)  
***Juniperus virginiana*, *J. horizontalis* and *J. scopulorum* II. Hybrid swarms of *J. virginiana* and *J. scopulorum*.**  
Bull. Torrey Bot. Cl. 1944 : 71 : 475-83.

*J. virginiana* and *J. scopulorum*, although readily distinguishable when samples are compared from regions where the distributions do not overlap, appear to form hybrid swarms in North and South Dakota and Nebraska.

366. KRUPENIKOV, I. A. 634.975:576.16(47)  
**Growth of *Pinus silvestris* L. in solonchak soils.**  
C.R. (Doklady) Acad. Sci. U.R.S.S. 1943 : 41 : 255-58.

An ecotype of *P. silvestris* L. is described which is adapted to the alkaline solonchak soils of southern Kazakhstan.

367. LANGLET, O. 634.975:581.143.26.035.1  
Photoperiodismus und Provenienz bei der gemeinen Kiefer (*Pinus silvestris* L.).  
[Photoperiodism and provenance in the common pine (*P. silvestris* L.)]  
Medd. Skogsförsöksanst. Stockh. 1942-43 (1944) : 33 : 295-327.

The study of variation in trees of different provenance is of importance in determining the adaptability of different climatic races for cultivation and in organizing breeding operations. The present paper deals with data already published on photoperiodism in the pine and new material as well. The aspects of the problem treated include: photoperiodism and vegetative development and flowering; and the significance of the endogenous rhythm for the development of the pine and the differential behaviour of pines of different provenance.

The induction of flowering by strangulation is also discussed with reference to provenance. A list is given of the features in which pines of northern and southern provenance differ.

368. ERDTMAN, H. 634.975:581.192:582  
Die Konstitution der Harzphenole und ihre biogenetischen Zusammenhänge VIII. Zur Kenntnis des Conidendrins (Sulfitaugenlactons) und dessen Verbreitung unter verschiedenen Coniferen. [The constitution of the resin phenols and their biogenetic relationships VIII. On conidendrin ("lactone from sulphite lyes") and its occurrence among different conifers].  
Svensk PappTidn. 1944 : 47 : 155-59.

Conidendrin is extractable from spruce wood with acetone. By sulphite digestion of wood from different conifers and examination of the waste liquors, it has been found that 7 out of 14 spruce species and 4 *Tsuga* species examined contained conidendrin, while out of the 7 *Abies* species examined only one contained the constituent, and this result is not certain. None of the *Pinus*, *Pseudotsuga* and *Larix* species examined were found to contain conidendrin, which was, however, found with matairesinol in the resinous exudates of *Podocarpus spicatus*. Pinoresinol has also been detected in the resinous exudates of some species of pine and spruce containing conidendrin (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 326).



369. SKINNER, F. L. 634.975:581.44  
**Cedar variation.**

N.S. Dak. Hort. 1944 : 17 : p. 112.

This article notes the variation in branching habit exhibited by *Thuja occidentalis*.

### VEGETABLES 635

370. BOSWELL, V. R. 635:575(73).  
**Disease-resistant and hardy varieties of vegetables.**

Nat. Hort. Mag. 1944 : 23 : 59-63.

A brief historical account is given of vegetable breeding achievements in the U.S.A. during the present century.

371. HASKELL, R. J. 635:575(75.7)  
**Vegetables made to order.**

Sth. Seedsman 1944 : 7 : No. 8 : 13, 38-39.

A brief account is given of some of the breeding projects being carried out at the U.S. Regional Vegetable Breeding Laboratory, Charleston, S.C.

372. NILSSON, E. 635:575.12:631.521.5(48.5)  
**Inkorsningsfaran vid köksväxtfröodling. (The danger of cross-pollination in the production of vegetable seed).**

Svensk Frötidn. 1940 : 9 : 48-50.

This warning to Swedish seed producers of the danger of cross-pollination between seed plots of vegetables and those of agricultural crops is accompanied by an enumeration of the various crosses that may occur between horticultural plants and agricultural crops or wild related forms. The degree of risk involved and the precautions to prevent hybridization are mentioned.

373. PEPKOWITZ, L. P.,  
 LARSON, R. E.,  
 GARDNER, J. and  
 OWENS, G. 635:577.16:581.02  
**The carotene and ascorbic acid concentration of vegetable varieties.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : p. 468. (Abst.)

This note is an abstract of a forthcoming paper dealing with the vitamin content of vegetables. Varietal differences in ascorbic acid content are found in beet, pepper and peas but none of these crops exhibit significant varietal difference in carotene content. The carotene content of carrots is however a varietal character. Environmental factors also exert a marked influence on the vitamin contents of these crops.

374. BOSWELL, V. R. 635-2-1.521.6  
**Disease-resistant and hardy varieties of vegetables.**

Nat. Hort. Mag. 1944 : 23 : 138-43.

Short accounts are given of the disease-resistant and hardy varieties of cabbage, celery and sweet corn.

375. SVENSSON, V. 635.13:575(48.5)  
**Morotsodling. En värdefull kultur för de lättare jordarna. (Carrot growing. A valuable crop for lighter soils).**

Weibulls Ill. Årsb. 1944 : 39 : 31-35.

Red carrots contain the greatest amount of  $\beta$ -carotene of all the crops analysed. The red varieties Regulus and London Torg [London Market] showed a considerably higher quantity of  $\beta$ -carotene as compared with five other varieties tested. Regulus also kept best in storage experiments. The annual variation of these experiments was considerable but the five year average percentage of quite fresh roots as compared with the weight stored was 73.1% for Regulus, 72.5% for Supra vit jätte [Super White Giant] and 68.1% for London Torg.

376. WOODBURY, G. W. and  
 SCHULTZ, H. K. 635.13:575:581.165:578.08  
**Crown division of roots as an adjunct to carrot breeding and seed production studies.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 488-90.

The technique of crown division is described for carrot roots.

377. JONES, H. A.,  
CLARKE, A. E. and  
STEVENSON, F. J. 635.25:575.116.1  
**Studies in the genetics of the onion *Allium cepa* L.**  
Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 479-84.

The following recessive genes are described: *a*, albino seedling; *y*<sub>1</sub> and *y*<sub>2</sub>, yellow seedling; *pg*, pale green seedling; *v*, virescent seedling; *gl*, glossy foliage; *ea*, exposed anther; and *ya*, yellow anther. Gene *y* is linked with *gl*.

378. BINKLEY, A. M. and  
JONES, H. A. 635.25:575.125  
**A comparison of Sweet Spanish hybrids with commercial Sweet Spanish onion strains.**  
Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 485-87.

Increased yields have been obtained in one lot of hybrid onion seed.

379. HAWTHORN, L. R. 635.25:575.42  
**Texas Grano—new strain is earlier and yields more U.S. No. 1 onions than Early Grano.**  
Sth. Seedsman 1944 : 7 : No. 8 : 12, 52.

Texas Grano, a selection from Early Grano, is an earlier strain and yields a more uniform high quality crop than the parent variety.

380. WALKER, J. C.,  
JONES, H. A. and 635.25-2.451.3-1.521.6:575.127.2  
CLARKE, A. E. 635.25:575.129  
**Smut resistance in an *Allium* species hybrid.**  
J. Agric. Res. 1944 : 69 : 1-8.

The smut resistant variety Nebuka of *A. fistulosum* has been crossed with the susceptible species *A. Cepa*, and an F<sub>1</sub> hybrid intermediate in smut resistance has been obtained. This is self-sterile but can be back-crossed with difficulty to *A. Cepa*. The amphidiploid hybrid of this cross also exhibits an intermediate degree of smut resistance.

381. GURGEL, J. T. A. 635.34:575(81)  
635.34:576.312.35  
Experimentos sobre hortaliças. (**Experiments with vegetables**).  
Rev. Agric. Piracicaba 1943 : 18 : 450-54.

The different degrees of sterility observed in *Brassica juncea* are enumerated. Cytological studies have shown *n* = 10 in five forms and *n* = 18 in two forms. Selection experiments have been started with the object of removing the bitter taste found in some of the forms.

In *B. oleracea* the chromosome number *n* = 9 was found in all forms examined. Owing to self-sterility, the broccoli stocks in Brazil are very mixed, containing a number of hybrids with cauliflower. Two self-fertile lines possessed of good horticultural qualities have been produced by selection.

In cauliflowers the best commercial types tend to have imperfect flowers and selection is being aimed at a successful compromise between these two characters.

In cabbage, flowering was found to be affected both by cold and a number of other factors; some lines could be induced to flower by defoliation alone, others could not be made to flower without refrigeration.

382. POOLE, C. F.,  
GRIMBALL, P. C. and  
KANAPAU, M. S. 635.34:577.16  
**Factors affecting the ascorbic acid content of cabbage lines.**  
J. Agric. Res. 1944 : 68 : 325-29.

Varietal differences in the vitamin C content of cabbages are reported. A significant negative correlation has been found between the concentration of ascorbic acid and head weight.

383. WHITCOMB, W. D. 635.34-2.7-1.521.6  
**The cabbage maggot.**  
Bull. Mass. Agric. Exp. Sta. 1944 : No. 412 : Pp. 28.

This bulletin includes an account of varietal resistance of the cabbage to maggot fly (*Hylemya brassicae* Bouché).



384. EINSET, J. 635.52:576.356.5:581.162.5  
**Cytological basis for sterility in induced autotetraploid lettuce**  
 (*Lactuca sativa* L.).  
 Amer. J. Bot. 1944 : 31 : 336-42.

The partial self-sterility of autotetraploid lettuce cannot be adequately explained as a consequence of chromosomal aberration. Two other factors are important, firstly, meiotic breakdown in the embryo sac, and secondly, the failure of many pollen tubes to reach the ovules.

385. 635.52-2.112-1.521.6  
**New lettuce enjoys heat.**

Sth. Seedsman 1944 : 7 : No. 7 : p. 51.

Lettuce strains have been developed which are able to germinate at 90° F.

386. THOMPSON, R. C. 635.52-2.8-1.521.6:575.127.2  
**Reaction of *Lactuca* species to the aster yellows virus under field conditions.**  
 J. Agric. Res. 1944 : 69 : 119-25.

Certain strains of *L. Serriola* and *L. saligna* are resistant either to aster yellows or its vector. *L. Serriola* will cross readily with *L. sativa* and *L. saligna* with *L. Serriola*.

387. HUTCHINS, A. E. and SANDO, L. 635.61/2(77.6)  
**Gourds—their culture, uses, identification, and relation to other cultivated Cucurbitaceae.**  
 Bull. Minn. Agric. Exp. Sta. 1941 : No. 356 : Pp. 35.

An account is given of gourd varieties, including a note on hybridization and a list of chromosome numbers.

388. POOLE, C. F. 635.61:575.11  
**Genetics of cultivated cucurbits.**  
 J. Hered. 1944 : 35 : 122-28.

A review of the present state of knowledge concerning the genetics of cultivated Cucurbitaceae is presented. The following genes have been discovered in *Citrullus vulgaris*: *A,a* (monoecious, andromonoecious); *D,d* (solid black testa, dotted black testa); *RTW* (black testa), *RTw* (clump testa), *RtW* (tan testa), *Rtw* (white tan-tipped testa), *rTW* (green testa), *rtW* (red testa), *rtw* (white pink-tipped testa); *E,e* (non-explosive rind, explosive rind); *Y,y* (red flesh, yellow flesh); *G,g*, *g* (dark green skin, striped skin, light green skin); *M,m* (self-coloured skin, mottled skin); *P,p* (self-coloured skin, pencilled lines on skin); *O,o* (elongate fruit, spherical fruit); *LS* (medium seed), *Ls* (short seed), *ls* (long seed); *C,c* (canary-yellow flesh, pink flesh); *F,f* (smooth fruit, furrowed fruit); and *B,b* (anthracnose resistant, anthracnose susceptible). The Sun, Moon and Stars mottle pattern is determined by cytoplasmic factors.

For *Cucumis sativus*, the following genes have been recognized: *F,f* (coarse spines on fruit, fine spines); *B,b* (black spines, white spines); *S,s* (few spines, numerous spines); *I,i* (determinate growth habit, indeterminate growth habit); *H,h* (heavy fruit netting, no netting); *RC* (red fruit), *Rc* (orange fruit), *rC* (yellow fruit), *rc* (cream fruit); *T,t* (tall, short), *W,w* (cream flesh, white flesh); *A,a* (spines, no spines); *M,m* (mottled skin, self-coloured skin); *G,g* (dull skin, glossy skin); *Te, te*, (tough skin, tender skin); *Tu, tu* (warted skin, non-warted skin); *D,d* ("female" sex habit, "male" habit); *Y,y* (orange corolla, yellow corolla); *V,v* (normal leaf discoloration, virescent leaves); and *P,p* (smooth brown fruit, rough yellow fruit).

Sex habit genes have been discovered in *Cucumis Melo*, viz. *AG* (monoecious), *Ag* (gynomonoecious), *aG* (andromonoecious), and *ag* (hermaphrodite).

Linkage data for these species are given when known.

389. CURRENCE, T. M., LAWSON, R. E. and BROWN, R. M. 635.611:581.47:578.08  
**A rapid method for finding the volume and density of muskmelon fruits.**

J. Agric. Res. 1944 : 68 : 427-40.

A mathematical formula has been derived for the calculation of the volume of musk-melon fruits.

390. 635.611-2.411.4-1.521.6:575.115  
635.611-2.7-1.521.6:575.115  
IVANOFF, S. S.  
**Resistance of cantaloupes to downy mildew and the melon aphid.**  
J. Hered. 1944 : 35 : 35-39.

Cantaloupes resistant to *Peronoplasmodium cubensis* and *Aphis gossypii* have been obtained by crossing commercial varieties with the resistant West Indian varieties Smith's Perfect, Green Fleshed Rocky Dew and Cuban Castillian. Resistance behaves as a partially dominant character.

391. 635.62:581.162.5:575.11  
HUTCHINS, A. E.  
**A male and female sterile variant in squash, *Cucurbita maxima*, Duchesne.**  
Proc. Amer. Soc. Hort. Sic. 1944 : 44 : 494-96.

A male and female sterile variant of *C. maxima* is described; it is apparently determined monomerically.

392. 635.64:575(79.7)  
VINCENT, C. L.  
**Washington State: a new forcing tomato.**  
Bull. Wash. Agric. Exp. Sta. 1944 : No. 436 : Pp. 12.

Washington State is a new forcing tomato derived from Bonny Best x Sutton's Best-of-All. It keeps and transports well and has superior quality.

393. 635.64:575.12  
CURRENCE, T. M.  
**Commercial advantages of hybrid tomatoes.**  
Seed World 1944 : 55 : No. 9 : 8-9.

A brief account is given of the commercial advantages of hybrid tomatoes.

394. 635.64:576.16  
FRIMMEL, F. v.  
**Welcher Artbildungsvorgang hat zur Domestikationsform *Lycopersicum esculentum* Mill. geführt? (What kind of process of species formation has led to the domesticated form *L. esculentum* Mill.?).**  
Z. Pflanzenz. 1943 : 25 : 437-42.

Bailey's classification of the formenkreis of the tomato is taken as the starting point of the author's argument in which he establishes the gesamtformenkreis of the forms allied to the cultivated tomatoes as consisting of the two species *L. pimpinellifolium* (wild original species) and *L. esculentum* comprising the sub-groups (a) *cerasiforme* and (b) *commune*.

The cherry-shaped tomatoes (a) occur spontaneously and in cultivation and exhibit variation in a series of mutations, which, if they determine sufficiently remarkable changes of habit, acquire systematic rank. The (b) group consists of the ordinary large fruited tomato which only occurs in cultivation and which also exhibits mutants which may, as in the (a) group, acquire systematic rank.

Discussing the problem of the difference between the original species *L. pimpinellifolium* and the forms found in cultivation, the author advances the view that the difference between *L. pimpinellifolium* and *L. esculentum* does not consist only in the total number of gene mutations that have occurred in the formenkreis *commune*, for the *L. pimpinellifolium* formenkreis also exhibits analogous mutations, but with a distinct tendency to more delicate structure of the whole. The seeds of *L. pimpinellifolium* are smaller than those of *L. esculentum*, the leaves, stems and floral organs are more delicately formed and even the chromosomes are smaller.

The species forming process which constitutes the difference between the wild form and cultivated races does not consist in a heaping up of gene mutations but in a multiplicative process within the genomes as a whole and resembling polyploidy, but not identical with it. The individual chromosomes have not doubled. This pseudo-gigas formation process can only be visualized as a multiplication by mass, affecting all the individual genes and resulting in larger chromosomes. In the author's view this multiplication of the gene mass is connected with the tendency to fasciation which is exhibited by all organs in the tomato plant and which has been exploited in breeding giant fruits.

Though it is still an open question how far the tendency to fasciation is connected with the tendency to reduplication of organs, a certain underlying regular tendency to such reduplication, initiated by the genes affecting all the organs, can be discerned in the range of forms of the tomato group.



395.

635.64:577.16:575(73)  
635.615-2.484-1.521.6:575**Research work and workers.**

Seed World 1944 : 55 : No. 6 : p. 24.

The following new varieties are mentioned: Red Cloud, an early determinate tomato suitable for Nebraska; Sioux, an indeterminate tomato also suitable for Nebraska; Coventry, from Pritchard x Ailsa Craig, a tomato characterized by freedom from cracking and a high ascorbic acid content; and Blacklee, a wilt resistant water-melon which has dark red flesh and transports well.

396.

CURRENCE, T. M.

635.64:581.162.5:575.11:575.12

**A combination of semi-sterility with two simply inherited characters that can be used to reduce the cost of hybrid tomato seed.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 403-06.

A long styled semi-self-sterile character is described which seems to be determined by the interaction of two recessive genes. If these genes were transferred to cultivated varieties, with the addition of the recessive marker genes determining potato leaf and green stem, F<sub>1</sub> tomato hybrids could be produced without the necessity of emasculation.

397.

SMITH, P. G.

635.64:581.3:575.127.2:578.08

**Embryo culture of a tomato species hybrid.**

Proc. Amer. Soc. Hort. Sci. 1944 : 44 : 413-16.

F<sub>1</sub> hybrids have been obtained of the cross *L. esculentum* x *L. peruvianum* P.I.128657 by means of the embryo culture technique. The hybrids grow vigorously but are self-sterile. They can be back-crossed to *L. peruvianum* but a repetition of embryo culture methods will probably be necessary in order to obtain progeny from the back-cross to *L. esculentum*.

398.

KREUTZER, W. A. and

BRYANT, L. R.

635.64-2.411.4-1.521.6

**Varietal resistance and mulching show promise in control of tomato fruit rot.**

Colo. Fm Bull. 1943 : 5 : No. 1 : 12-15.

Varietal resistance of tomatoes to fruit rot (*Phytophthora Capsici*) is reported.

399.

ELLIS, D. E.

635.64-2.6-1.521.6

**Root knot resistance in *Lycopersicon peruvianum*.**

Plant Dis. Reporter 1943 : 27 : 402-04.

Reports of the root knot (*Heterodera marioni*) resistance exhibited by *L. peruvianum* have been confirmed.

400.

SMITH, P. G.

635.64-2.8-1.521.6

**Reaction of *Lycopersicon* spp. to spotted wilt.**

Phytopathology 1944 : 34 : 504-05.

Resistance to spotted wilt has been confirmed in Porter's strain of *L. pimpinellifolium* and in five strains of *L. peruvianum*. A high degree of resistance has also been discovered in a selection of the variety German Sugar of *L. esculentum*.

401.

JENSEN, J. H. and

LIVINGSTON, J. E.

635.65-2.3:576.16:631.521.6

**Variation in symptoms produced by isolates of *Phytonomonas medicaginis* var. *phaseolicola*.**

Phytopathology 1944 : 34 : 471-80.

Significant differences have been found in the degree of pathogenicity of isolates of *P. medicaginis* var. *phaseolicola* when inoculated into Red Kidney beans.

402.

HEDGES, F.

635.65-2.3-1.521.6:632.8

**Association of *Xanthomonas phaseoli* and the common bean-mosaic virus, *Marmor phaseoli*. I. Effect of pathogenicity of the seed-borne infective agents.**

Phytopathology 1944 : 34 : 662-93.

"*Xanthomonas phaseoli* may be masked in either mosaic-susceptible or mosaic-immune bean varieties. Mosaic-infected trifoliate leaves, used customarily as bean virus 1 inoculum were not infrequently symptomless carriers of *Xanthomonas phaseoli*."

In one experiment bean-mosaic virus apparently persisted in cultures of *Xanthomonas phaseoli* on steamed potato for as long as 6 weeks and in those of *X. phaseoli* variant for 11 days. With the possible exception of 4 isolates from the serial passages, no evidence of such persistence of the virus in culture was detected in other more extensive trials.

In the long-continued *in vivo* association of the two seed-borne pathogens in serial transfers from bean plant to bean plant, there occurred a decrease in the pathogenicity of the bacterium and a more or less steady increase in that of the virus to the point of extreme intensity, and individual variation in mosaic-resistance was no longer manifest.

Variants of *Xanthomonas phaseoli* differing in colony type and in virulence appeared in reisolation plates from bean plants inoculated with a combination of the bacterium and the mosaic virus. It is suggested that the virus influenced the tendency of the bacterium to dissociate".

403. PERSON, L. H. 635.65-2.485:575.242:631.521.6

**The occurrence of a variant in *Rhizoctonia solani*.**

Phytopathology 1944 : 34 : 715-17.

A sector variant is described of a culture of *R. Solani* isolated from a snap bean. It is less pathogenic than the original form.

404. HUA, H. 635.651:581.162.32(51)

**(Natural crossing in *Vicia faba*).**

Chinese J. Agric. Sci. 1943 : 1 : 63-65.

Natural cross-pollination of *V. Faba*, mainly effected by bees, accounts for 32.90% of the total fertilizations in Suinin, Szechuan.

405. ALLARD, H. A. and ZAUMEYER, W. J. 635.652:581.143.26.035.1

**Responses of beans (*Phaseolus*) and other legumes to length of day.**

Tech. Bull. U.S. Dep. Agric. 1944 : No. 867 : Pp. 24.

A detailed account is given of the reaction of varieties of *Phaseolus vulgaris* L. and *Ph. lunatus* L. to different photoperiods. Other leguminous species are also considered.

406. CALDWELL, J. S. and CULPEPPER, C. V. 635.652:581.6(73)

**Snap-bean varieties suited to dehydration. Part 1 and 2.**

Canning Age 1943 : 24 : 309-11, 313, 363-64, 366, 368.

Variation in the yielding capacity, adaptability and canning quality of snap beans is described.

407. HARTER, L. L. and ZAUMEYER, W. J. 635.652-2:576.16:631.521.6:575.11  
635.653-2:576.16:631.521.6:575.11

**A monographic study of bean diseases and methods for their control.**

Tech. Bull. U.S. Dep. Agric. 1944 : No. 868 : Pp. 160.

An account is given of the varietal response of beans towards the following pathogens: *Colletotrichum Lindemuthianum*, *Uromyces Phaseoli typica*, *Fusarium Solani* f. *Phaseoli*, *Erysiphe Polygoni*, *Macrophomina Phaseoli*, *Sclerotinia sclerotiorum*, *Xanthomonas Phaseoli*, *Pseudomonas Medici*ginis var. *phaseolicola*, *Corynebacterium flaccumfaciens*, common bean mosaic, yellow bean mosaic, southern bean mosaics, curly top, *Heterodera marioni* and *Empoasca fabae*. The following pathogens of lima beans are also considered: *Nematospora Phaseoli*, *Colletotrichum truncatum*, *Uromyces Phaseoli typica*, *Colletotrichum Lindemuthianum* and lima bean mosaic. Physiological specialization, the genetics of disease resistance and the inheritance of abnormalities are treated in addition.

408. RICHARDS, B. L. and BURKHOLDER, W. H. 635.652-2.8:576.16:631.521.6:575

**A new mosaic disease of beans.**

Phytopathology 1943 : 33 : 1215-16.

A virus disease of beans has been discovered which produces symptoms similar to those of the common bean mosaic and is transmitted through the seed. The bean varieties Red Kidney and Bountiful are susceptible to both the common and the new bean mosaic virus whilst Norida, Red Mexican 3, Great Northern 15, Robust and Michelite are susceptible to the new strain only. Great Northern 1 and 59, Ashley's Wax, Cooper's Wax, and Refugee 5 are immune to both strains. Breeding work is in progress to produce a small white bean, combining immunity to the two viruses.



409. DANA, B. F. 635.652-2.8-1.521.6:575.12

**The Pioneer bean—resists curly top.**

Seed World 1944 : 55 : No. 8 : 46-47.

Pioneer is a new bean variety derived from Burtner x Blue Lake. It is resistant to curly top and common bean mosaic.

410. MORSE, W. J. 635.655:575(73)

**Registration of varieties of soybeans, II.**

J. Amer. Soc. Agron. 1944 : 36 : 458-60.

Three new soya bean varieties are described. Patoka, a selection from P.I. No. 70218-24, is adapted to conditions in southern Indiana; it yields well and the seeds have a high oil and protein content. Gibson, from Dunfield x Midwest, is a high yielding variety suitable for south-west Indiana. Earlyana is adapted to northern and central Indiana. It develops rapidly in the early stages of growth and was selected from Dunfield, the original selection probably being a natural hybrid.

411. WEBER, C. R. 635.655:575.12

**More, better soybeans.**

Fm Sci. Reporter, Iowa 1944 : 5 : No. 1 : 3-6.

The recently introduced soya bean variety Lincoln is described. It arose from a cross between a white flowered Mandarin and Manchu. Although lodging more readily than Richland or Mukden, it out-yields both these varieties.

412. GELIN, O. 635.656:575(48.5)

Weibulls gula kokärter. Original Munk, Ambrosia II och Kloster (720-29).

[Weibull's yellow culinary peas—Original Munk, Ambrosia II and Kloster (720-29)].

Weibulls III. Årsb. 1944 : 39 : 24-27.

The good qualities of Weibull's Munk pea, put on the market in 1926, and of Svalöf's Torsdags II are mentioned and illustrated by a yield table for fourteen districts in Sweden. Similar data are shown for the yellow pea Ambrosia II, which in the southern parts of the country is recognized as a high yielding variety of first class quality.

Cooking quality is genetically conditioned but readily modified by environment which must therefore be uniform in comparative trials. Results of such trials show that Munk ranked first in cooking quality, having received 27.1 points as compared with 20.9 and 18.2 for Ambrosia II and Torsdags II respectively.

In yield Munk competed satisfactorily with Torsdags II and in southern districts Ambrosia II surpassed the control. In quality Munk was first, Ambrosia II showed a higher utility value than Torsdags II.

Weibullsholm Plant Breeding Institute will probably release a new culinary pea, Kloster (720-29), next year. In trials from 1932-43 it surpassed Torsdags II in yield except in two years and in the official trials it gave 5% more seed than Torsdags II for three years. Kloster is superior to Munk, Ambrosia II and Torsdags II in cooking quality, having obtained an average of 28.7 points.

413. LAMPRECHT, H. and SVENSSON, V. 635.656:575(48.5)

Weibulls Original Balder. Ny ärtsort, som kommer i marknaden våren 1944.

(Weibulls Original Balder. A new pea which will come on the market in spring 1944).

Weibulls III. Årsb. 1944 : 39 : 27-30.

Weibull's Original Balder is a low marrow-fat variety selected from Witham Wonder x Stens. The original aim, a low pea comparable to Stens Weibull's Original in quality, earliness and yield has not been attained except as regards yield, in which Balder surpassed Stens by about 10%. Balder is dark green and resembles Witham Wonder in the pod, which is pointed but somewhat narrower. It attains a height of 61 cm. (six years' average) as compared with 46 cm. for Witham Wonder, which it also surpassed by 62.4% in yield of pods per 100 sq. metres and by 84% in yield of seed.

It is somewhat later than Stens Weibull's Original but equals it in quality and is specially suitable for preserving.

In the Official Horticultural trials at Alnarp (1939) Balder was graded as a first class strain and in 1940 was placed equal with Delikatess in yield of pods and earliness and also showed good disease resistance; it was also stated to have pods that are easily opened and bear 55% of viable seeds.

It is easy to grow.

414. LAMPRECHT, H. 635.656:575.116.1.061.6  
Genstudien an *Pisum sativum*. VIII. Das Testamerkmal *griseostriata* und seine Vererbung. (**Gene studies of *Pisum sativum*. VII. The testa character *griseostriata* and its inheritance**).  
Hereditas, Lund 1944 : 30 : 627-30.

A new character, *griseostriata*, determined by the recessive gene *gri* is described. It appears as a pale greyish stripe on the testa but can only be recognized with certainty when the testa is unpigmented. Linkage between *gri* and *m* is probable.

415. LAMPRECHT, H. 635.656:581.192:575.11  
Genstudien an *Pisum sativum*. VI. Weitere Ergebnisse zur Vererbung der Wachslosigkeit. (**Gene studies of *Pisum sativum*. VI. Further results on the inheritance of waxlessness**).  
Hereditas, Lund 1944 : 30 : 613-20.

The mode of interaction of the following wax determining genes is described:  $W_{a_1}$ ,  $W_{a_2}$ ,  $wa$ ;  $Wb_1$ ,  $Wb_2$ ,  $wb$ ;  $Wlo$ ,  $wlo$ ;  $Wsp$ ,  $wsp$ ; and  $Bl$ ,  $bl$ .

416. LAMPRECHT, H. 635.656:581.192:575.116.1  
Genstudien an *Pisum sativum*. VII. Tragantflecken zwischen Keimblättern und Testa sowie ihre Vererbung. (**Gene studies of *Pisum sativum*. VII. Tragacanth spots between the cotyledons and the testa and their inheritance**).  
Hereditas, Lund 1944 : 30 : 621-27.

The recessive gene *tram* determines the secretion of two spots of a substance resembling tragacanth by the inner wall of the testa. This character is only observable when the testa is unpigmented. Linkage between *tram* and *r* has been demonstrated.

417. BJÄLFVE, G. 635.656:581.6:578.08  
Ärternas kokbarhet och fosfathalt. (**Cooking quality of peas and phosphate content**).  
Lantmannen 1944 : 28 : 44-46, 68-69.  
GELIN, O. and  
SCHWANBOM, N.  
Ärternas kokbarhet. (**Cooking quality of peas**).  
Ibid. 1944 : 28 : 209-10.

In the first paper it is stated that Torssell (cf. "Plant Breeding Abstracts", Vol. 13, Abst. 1010) has shown that difference between varieties of peas in regard to the ease with which they cook is based on hereditary differences. The present paper demonstrates a positive correlation between cooking quality and phosphate content and the injurious effect of inadequate rainfall on the uptake of phosphate by peas.

From information from foreign sources apparatus devised for experiments to test how readily peas will cook are described and illustrated.



## BOOK REVIEWS

TIPPETT, L. H. C.

### **The methods of statistics.**

519

Williams and Norgate, Ltd., London 1941 : 3rd Ed. : 17s. 6d. : Pp. 284. tables. 13 figs.

This excellent introduction to statistics achieves the difficult task of being popular in style while having sufficient mathematics to make the development coherent.

The early chapters are devoted to some of the necessary fundamental ideas, together with notes on significance testing and maximum likelihood. After discussions on  $\chi^2$  and Student's "t" an account is given of the analysis of variance which continues in one form or another to the end of the book.

A mathematician, having read this book, would be in a fit state to tackle many contemporary papers on statistics, but whether mathematician or not, the reader's outlook might be biased on some matters. Thus, he would have no idea of the sample space of Neyman and Pearson, and of its relevance to the general theory of significance testing, and he would have no idea of sequential analysis. Of course, the treatment is only introductory, but it is worth while indicating the theoretical value of the tests given. Statistics is an actively developing subject, and useful research is being done in some of its simplest sections.

Certain specific points deserve mention. The  $L_1$  test for the homogeneity of a set of estimates of variance has given place to the Bartlett test, which uses the  $\chi^2$  tables. Many examples are quoted on the testing of different hypotheses in regression, and it seems worth while pointing out that all these tests arise from the same principle. In testing the significance of a particular effect or value, we are really testing the change which occurs when the condition is relaxed. Thus, the effect may be that of linear regression. Then, by imposing the condition, we stipulate that the true regression takes a particular value; by relaxing it, we allow it to take its sample value. Let  $S$  be the sum of squares of residuals when the condition is imposed, and  $S^1$  be the sum of squares of residuals when the condition is relaxed; let  $S$  have degrees of freedom  $n$ , and  $S^1$  have degrees of freedom  $n^1$ . We then test  $(S-S^1)/(n-n^1)$  with  $(n-n^1)$  degrees of freedom against  $S/n$  with  $n$  degrees of freedom. If this ratio is significant, then so also is the effect.

Section 10.31 is particularly difficult. It might have been preferable to have used the generalized factorial analysis of variance, or alternatively suitable linear hypotheses with the principle of least squares. In particular, a first order interaction is more easily conceived as the variance associated with the residual sum of squares in a two factor analysis when the main effects have been removed; for one thing, this concept is capable of immediate generalization. S. N. C.

IBSEN, H. L.

575.1

### **Principles of genetics.**

John S. Swift Co., Inc., St. Louis-Chicago-New York-Cincinnati 1942 : Pp. 118. figs. tables. illus. (Mimeographed).

As a science develops from a heterogeneous body of disconnected observations to a closely integrated system of fact, generalization and explanatory hypothesis, a corresponding transition is often found in the methods of presentation adopted by the writers of its text-books. In the earlier days of a science, accounts of the relevant facts tend to be presented in an historical framework since this affords the most evident scheme of inter-relation, but as further knowledge is obtained, such a mode of presentation is usually replaced by a more logical order, basic principles being expounded first and the more complicated relationships developed from them. Genetics has now reached the stage where this logical method may be attempted, and the book under review represents an interesting example of such an endeavour.

Dr Ibsen's treatment is general, although, since his bent is chiefly zoological, he lays special emphasis on sex linkage and sex determination. Historical matter is reduced to a brief biographical sketch of Mendel in chapter V, a note not entirely free from inaccuracies since Mendel did not begin his scientific work until after he entered the monastery at Brunn. Also, can we be sure that Darwin would have modified his evolutionary theory if he had seen Mendel's paper? The significance of Mendel's work was so generally overlooked that to postulate a hypothetically different attitude, even on the part of Darwin, may not be fully justified.

The arrangement of the book is good and the presentation, on the whole, lucid. Diagrams are freely used and add much to the clarity of the exposition. Several readers might prefer a more

detailed account of relevant cytological processes, but in the limited space available such an omission is readily understandable. The sequence adopted is a brief account of the chromosomes, followed by simple genetical segregations, modified segregation ratios, epistasis, multiple factors, modifiers, multiple allelomorphs, linkage and sex linkage, chromosomal aberrations and selection and breeding methods. Every effort is made to treat these various aspects harmoniously, the concordances between theory and fact being stressed rather than the data that still remain without a satisfactory explanation. It is a debatable matter how far unexplained facts should be introduced in a text-book intended for university students, for, although it is necessary to give first year students a comprehensive picture of established theory, it is unwise to avoid all controversial issues, as this tends to develop an improper respect for insufficiently grounded hypotheses.

Certain criticisms must also be made, chiefly on points of detail. The opening sentence of chapter one, that "every living organism, not microscopic in size, is made up of many small bodies known as cells" ignores the existence of the order Siphonales of the Chlorophyceae which is composed mainly of aseptate coenocytes; one of these forms, *Codium tomentosum*, a much-branched British species, may attain a length of 60 cm. Also, the assertion (p. 57) that all one-celled organisms are diploid when multiplying asexually appears to contradict Prof. Fristsch's conclusion that "the majority of the Chlorophyceae and probably all Xanthophyceae, Chrysophyceae, etc., are haploid organisms." The statement (p. 58) that "the larger, non-motile, gamete is . . . often called the ovule in plants" is incorrect since the latter term is always applied to the megasporangium.

Turning to cytological and genetical points, it is not true to say (p. 2) that the number of chromosomes is constant within a species, for many examples of intraspecific polyploid series are known. Nor does the cytoplasm always fill the cell cavity surrounding the nucleus (p. 1) for the majority of differentiated plant cells are vacuolated. The statement on p. 45 that no zygote can include more than two allelomorphs ignores the possibility of polyploidy although this is treated later, and coin tossing (p. 9) will not make genetical facts more apparent but will merely illustrate the relevant hypothesis.

Minor criticisms could be directed against the lack of distinction drawn between genes as hereditary units and as chromosome loci, and this probably accounts for the rather unsatisfactory treatment of the Presence and Absence gene theory. The account of heterosis is very cursory and mentions only one of the many current explanatory hypotheses.

Since this book is written from a logical angle, it is natural that criticism should be directed to matters of precision. Humanly speaking, logical impeccability is impossible although an ideal, and such criticisms as have been made do not detract from the admirable qualities that this book exhibits.

RAFINESQUE, C. S.

582.001.4:9

**A life of travels.**

Chronica Botanica 1944 : 8 : 293-360. (Published by Chronica Botanica Co., Waltham, Mass.). \$2.50.

In these days of intensive specialization, few could be found who would boast with Rafinesque that "I have been a Botanist, Naturalist, Geologist, Geographer, Historian, Poet, Philosopher, Philologist, Economist, Philanthropist . . . . By profession a Traveller, Merchant, Manufacturer, Collector, Improver, Professor, Teacher, Surveyor, Draftsman, Architect, Engineer, Pulmist, Author, Editor, Bookseller, Librarian, Secretary . . . . and I hardly know myself what I may not become as yet". To attain even a moderate conversance with such a range of subjects was becoming increasingly difficult with every decade of the nineteenth century and Rafinesque was one of the last and hardly successful examples of the all-embracing scientific dilettante.

This excellent reprint of his "Life and Travels" will do much to bring home to scientists an interesting and by now extinct phase in the history of their subject. Rafinesque's researches have indeed a general interest but their particular relevance is to the systematic botany of America which is indebted to Rafinesque for several of its more recalcitrant nomenclatural problems. Later botanists have spoken disparagingly on Rafinesque's taxonomic studies and with considerable justification since he was notorious for his introduction of new names and his egoistic treatment of systematic problems. Such criticism, however, although justified in many respects, must not blind us to the merits and originality of his work.



Hewas an indefatigable collector and "herbarized" and botanized in many parts of North America, also around the shores of the Mediterranean. In addition, he had a flair for making acquaintance with other workers in the scientific field whose ideas no doubt assisted in stimulating his own fertile mind. Many of the binomials that he introduced are valid according to the International Rules of Botanical Nomenclature, although the fact that they were ignored by his contemporaries and by succeeding writers provides a case for their being relegated to the category of *nomina rejicienda*.

In any attempt, therefore, to establish an unbiased estimate of Rafinesque's achievements, it is necessary to re-examine his extensive but rare literary remains, realizing that his precocious brilliance could co-exist with a careless self-centredness which led to hasty conclusions and prevented his treating other authors' writings with due consideration. Further difficulties in such a study arise from the unavailability of many of his publications which are, at the moment, to be found in only a few of the larger libraries. This republication of the "Life" will introduce it to the public at large and includes, in addition to its autobiographical details, much information relating to his other published works.

The *Chronica Botanica* reprint is prefaced by an appreciation by E. D. Merrill and concludes with a critical index of personal names compiled by F. W. Pennell.

KANITKAR, N. V.  
**Dry farming in India.**

63-2.112(54)  
575:633(54)

Scientific Monograph of the Imperial Council of Agricultural Research, New Delhi 1944: No. 15: Pp. 352. tables. figs. 21s. 6d.

This publication follows a suggestion made by Sir John Russell during his visit to India in 1936-37, that a series of monographs should be prepared on various important agricultural topics. The subject treated, dry farming, is of vital significance for the more arid regions of India, and the account given is a valuable contribution towards the problem of recurrent crop failure and subsequent famine that so unhappily characterizes many regions of India.

After a preliminary survey of the relevant meteorological factors and the types of agriculture at present in vogue in the areas of low rainfall, the author reviews the general literature on dry farming, in particular that of the U.S.A. Details follow on the climatic and pedological conditions of the five Indian dry farming research stations, leading on to a study of rain water disposal and soil erosion. The important crops of these dry areas are the various millets and the need for breeding drought resistant and early varieties is indicated. Physiological studies on the water relations of these crops are also reported.

Concluding chapters summarize the preceding data and suggest suitable improvements in the present techniques of dry land farming.

FERNANDEZ VALIELA, M. V. 632  
Introducción a la fitopatología. (**Introduction to phytopathology**).  
Cent. Estud. Agron., Univ. B. Aires 1942: Pp. xvi + 625. 144 figs. tables.

In this fine tome of 625 pages the author gives a very complete survey of the subject of phytopathology for the benefit of Spanish and Latin American readers. The first part is historical and general and includes a section on resistance and its inheritance. The second part describes the different plant pathogens in turn, according to their systematic position; parasitic plants, viruses and physiological diseases are included in this section. The symptoms produced on the different hosts and control measures are included in the descriptions. The two final chapters are devoted to fungicides and protective legislation.

The volume is well documented and illustrated and contains a very useful index of hosts in addition to a general alphabetical index which contains both the Latin and Spanish names of the pathogens.

632:030.8:001.4

#### **List of common British plant diseases.**

Compiled by the Plant Pathology Committee of the British Mycological Society. Cambridge University Press 1944: 5s. Pp. 61.

This is the third edition re-modelled, revised and enlarged, of the *List of Common Names of British Plant Diseases* published in 1929. The host plants are arranged alphabetically by their most common names, thus automatically providing an index of common names of hosts. A

preliminary list of tree diseases has been incorporated. As most of the diseases enumerated occur abroad as well as in the British Isles, the foreign common names for the more important diseases are included.

In addition to indexes of authors and of Latin names, there is also an index of foreign common names, including Russian.

The explanatory introduction provides directions for the user of this highly useful publication. To all libraries of schools, colleges and faculties of agriculture, and to all translators or other persons engaged in the study of English and foreign scientific literature on plant pathology the list should prove invaluable.

SEIFFERT, G.

632.8

**Virus diseases in man, animal and plant.**

Philosophical Library, N.Y. 1944: \$5.00. Pp. ix + 332. 7 figs. 7 tables.

This translation of Dr Seiffert's "Virus und Viruskrankeiten bei Menschen, Tieren und Pflanzen" (Dresden 1938) is stated to contain a "survey and reports covering the major research work done during the last decade", but no direct reference is made to the date of the original work, and no revision has been attempted. A general section dealing with the properties and behaviour of viruses and the general characteristics of virus diseases is followed by a special section which includes a very brief account of plant viruses, and there is a concluding chapter on technique. In addition to a liberal use of italics in the text they are employed inconsistently for authors' names, and the book is by no means free from typographical errors and faults in translation.

W. R. S. W.

633(94.3)

**The Queensland Agricultural and Pastoral Handbook.**

1941: Vol. I: Pp. 448; 1940: Vol. II: Pp. 386; 1938: Vol. III: Pp. 254; 1939: Vol. IV: Pp. 199.

These four volumes provide a valuable introduction to the study of the crops raised in Queensland. The first volume opens with an account of the physiography and pedology of the state and describes its various agricultural institutions. Each crop is then treated individually, the methods of growing, harvesting and disposal being followed by descriptions, often illustrated, of the more important varieties. Cereals, cotton, tobacco, root crops, cucurbitaceous crops, lucerne, peanuts, leguminous plants and fodder plants are dealt with in volume one, which concludes with chapters on pasture management, plant breeding and farm book-keeping. Vegetables and tropical, semi-tropical and deciduous fruits are treated in volume two, and a section is devoted to packing and marketing. The third volume describes the more serious diseases and pests and outlines methods of control, and volume four is concerned wholly with the sugar cane. A high standard of presentation, good illustrations and a lucid text are among the several admirable features of this production.

633.2

**Advances in grassland husbandry and fodder production.**

Bulletin of the Imperial Bureau of Pastures and Forage Crops, Aberystwyth 1944: 4s. No. 32: Pp. 108. tables. figs.

This bulletin is a symposium of recent work on herbage crop plants. It includes reprints, translations, abstracts or notes of the following papers: (1) D. Meredith. Towards a national pastoral policy. *S. Afric. J. Sci.* 1943: 40: 37-56; (2) A. R. Saunders. *Union of S. Afric., Dept. of Agric. and For., Sci. Bull.* 1942: No. 14: Pp. 138; (3) W. H. Hamilton. Survey of the Dairy Industry in New Zealand. *N.Z. J. Sci. Techn.* 1942: 23A: 257-83, 1942-3; 24A: 1-35, 157-85, 223 63, 273-302; (4) L. W. Gorman and J. P. Lambert. The Grasslands Division Substation at Lincoln. *N.Z. J. Sci. Techn.* 1943: 25A: 73-80; (5) Various papers on the herbage seed position in the U.S.A.; (6) Canada, Dept. of Agric. P.F.R.A. A record of achievement. *Ottawa* 1943: Pp. 78; (7) Report of the Committee on Hill Sheep Farming in England and Wales. *Min. of Agriculture and Fisheries* 1944: Pp. 40; (8) Report of the Committee on Hill Sheep Farming in Scotland. *Dept. of Agriculture for Scotland* 1944: Pp. 127; (9) An appreciation of the scientific work of Capt. R. O. Williams by Prof. Jenkin; (10) S. K. Kondrašev. [Irrigation of Lucerne in U.S.S.R.]. *Vest. sel'skokhoz. Nauk Kormodobyvanie* 1941: No. 2: 78-86; (11) S. N. Chandrasekhara Iyyar and T. Venkatarama Reddy. Some common fodder-yielding trees in the Madras Presidency. *Ind. For.* 1942: 68: 435-46, 536-45; (12) a paper by A. M.



McArthur on the oil of *Trifolium subterraneum*, in *Proc. Roy. Soc. Victoria* 1942 : 54 : 243-44; (13) two papers on soil erosion published in Latin American journals; and (14) Soils and agriculture of Szechwan, *Nat. Agric. Res. Bur., Min. Agric. and For. Chungking Special Publication* 1942 : No. 27.

KOSAREV, M. G.

633.289  
633.289:575(47)

[Žitnjak (*Agropyron* spp.)].

Sel'khozgiz, Moscow 1941 : Pp. 168 : 119 tables. 18 figs.

The four species of *Agropyron* considered in this book are *A. pectiniforme* Roem. et Schult., *A. cristatum* (L.) Gaertn., both having broad spikes, *A. sibiricum* (Willd.) P.B. and *A. desertorum* (Fisch.) Roem. et Schult., both having narrow spikes. The botanical and other characters which distinguish one species from another are discussed in some detail; *A. pectiniforme* is notably resistant to cold and is the most widely distributed of the four species; *A. sibiricum* is peculiarly adapted to sandy ground; *A. cristatum* withstands cold; and *A. desertorum*, dry conditions. The bulk of the book is devoted to general questions of their cultivation.

Under "Questions of breeding" the first method discussed is that of collecting wild forms and selection of the most valuable from among the wide range of existing ecotypes. A rust resistant form has been discovered, for instance, in the Don basin and a non-shedding wide eared form in the Ural basin. These studies will ultimately show which are the zones in which the most promising types are to be found.

Varieties of uniform morphological type, painstakingly produced by plant breeders, have not proved superior in yield to the existing mixed varieties and the chief methods of producing improved varieties are stated to be (1) group mass selection within an ecological type and (2) individual group selection with progeny testing. Descriptions are given of two varieties that have been bred by repeated individual selection and the application of spatial isolation. These are No. 4 (*A. pectiniforme*), which has given yields of 6.5 centners of hay per hectare in the first year, 17.5 in the second, 18.3 in the third and 15.5 in the fourth; and No. 305 (*A. sibiricum*), a relatively early variety, very winter hardy and resistant to fungous diseases, though less drought-resistant than No. 4; its yields were 7.2 c. per ha. in the first year, 22.5 in the second, 23.4 in the third and 17.3 in the fourth.

Several newer varieties produced by breeding are also mentioned, though they have not yet been tested out definitively.

MERRILL, G. R.,

MACORMAC, A. R. and

MAUERSBERGER, H. R.

633.51:581.6

**American cotton handbook.**

American Cotton Handbook Co., N.Y. 1941 : Pp. 1024. illus. tables. charts.

This copiously illustrated reference book could be of considerable service to all those who, like the cotton breeders, are concerned with the cotton textile industry. The topics treated include the history of the American cotton industry, a brief outline of the cultivation of the different cotton varieties, and detailed accounts of the technical processes involved in the manufacture of cotton goods. There is a bibliography of books written in English on cotton technology and a useful glossary of technical terms employed in the industry. Special chapters have been written by A. H. Garside on cotton economics, by C. K. Everett on new cotton products, by H. Miedendorp, Jr., on the manufacture of sewing thread and hand-work cottons, by M. P. Fox on cotton weaves, by R. E. Smith, Jr., on the manufacture of terry fabrics, by E. R. Schwarz on quality tests, and by G. H. Johnson on laundering methods. There are two appendices, one by E. R. Schwarz on statistical methods, and another on the nomenclature of cotton dyes.

Such a comprehensive treatment alone would go far in recommending this book. Its value to plant breeders lies principally in the information given as to the quality requirements of the cotton industry.

GILL, T. and

DOWLING, E. C.

634.9

**The Forestry Directory.**

American Tree Association, Washington, D.C. \$2.00. 1943 : Pp. viii + 411.

tables. maps.

This useful reference book gives a comprehensive account of the organization and activities of

American federal, state and private forestry institutions. There is a brief historical introduction indicating the importance of American forests, followed by accounts of administration and forestry legislation, research, use of forests as recreational centres and game reserves, and the co-operative work between foresters and the soil conservation services. Descriptions are given of the facilities offered in forestry by the various American universities and these are followed by briefer accounts of Canadian and tropical forestry. Final sections treat the utilization of forest products during the war and the exploitation of guayule, concluding with sixteen pages of miscellaneous information and statistics, and an index to the whole book.

FORSAITH, C. C.

634.9:519

**Statistics for foresters.**

Tech. Bull. N.Y. St. Coll. For. 1943 : 16 : No. 4 : Pp. 69.

This bulletin is written for prospective foresters, who are given an elementary knowledge of statistical technique and the principles involved. The operations described cover the standard practices of grouping data, plotting frequency histograms, comparing the difference of means against a standard deviation, plotting correlation or scatter diagrams and drawing regression lines. Some of the procedures included are followed by minute instructions, and numerical examples are never lacking. In fact, if more attention had been paid to the mathematics and the symbolism, and less to the numerical examples and tables, it is probable that a more concise and precise exposition would have resulted, for although the bulletin may be consulted to advantage in finding out how to perform a given operation, the explanations are hardly adequate. It is not true that all populations or even most populations obey the "normal law". What usually happens is that a statistician interested in inducing the frequency distribution of a large population and in assessing his probability of error, postulates a certain distribution and sees how well it fits the facts. For reasons of simplicity he postulates the normal distribution where possible. The treatment of  $\sigma$  (the standard deviation) also calls for some comment. The rules given on p. 39 for the choosing of the numerical division in its estimation are hardly acceptable, for they suggest that, if the range of values in the sample is smaller than what one might intuitively suppose from a knowledge of the range of values in the whole population, the value of the estimate may be increased by dividing by  $n-1$  instead of  $n$ , (the sample size) thus obtaining a more exact estimate. Such an arbitrary procedure based on intuition is of doubtful value.

S. N. C.

PETRE, A.

634.972.6(48.5)

**Björken. (The birch).**

Kooperativa Förbundets Bokförlag, Stockholm 1942 : Pp. 56. photos.

This illustrated booklet presents a useful account of the birch in Sweden.

The introduction deals with the economic changes that have led to the recognition of the value of the birch in the present and future forest economy of the country. Two sections deal with the origin and distribution of the birch in Sweden, silvicultural aspects such as seed setting, seed distribution and seed raising, thinning, pruning, different types of birch, felling, logging, etc. Other sections are concerned with pest control, the birch as a soil improver and the uses of the timber.

In the botanical section the two main types of birch are distinguished and the different treatments they require in regeneration operations indicated. Birch seed and its germination and the raising of birch seedlings are also discussed. Since the valuable curly grain is heritable, seed from trees with this feature should be collected. Successful experiments have been recently carried out by Finnish and other workers on the grafting of branches from such trees. Giant races and their cytological basis are also briefly mentioned with observations on induced chromosome reduplication as a possible means of obtaining giant forms.

LINDQUIST, B. and

MALMBERG, E.

634.975:575:631.521.5(48.5)

**Bättre frö för framtidens tallskogar. (Better seed for future pine woods).**

Svenska Skogsvårdsföreningen & Lantbruksförbundets Tidskriftsaktiebolag,

Stockholm 1943 : 25 öre. Pp. 11. 9 figs.

Genotypic variation and the effect of environment and the application of the laws of breeding are outlined. The methods of breeding in forestry work differ from those used for crop-plants. Better seed of forest trees is needed and in pine breeding the aims are rapid growth and a desirable branching habit.



The subdivisions of the pine into races of different branching habit are defined with some illustrations (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 646). The quality of the timber must be improved and the volume increment increased, the rotation period being thereby shortened. The method originally used, viz. (1) selective thinning and (2) the choice of cones from single trees and stands of the desired type produced only small quantities of seed. To obtain high grade seed in sufficient quantities for the whole country in a few decades, large scale multiplication of progeny tested pines with the desired habit of growth and branching was therefore used. By this procedure very large numbers of small grafted trees of suitable type can ultimately be obtained, and can be induced to flower and set cones by strangling the base of the stem with thick steel wire. From a plantation of such trees, 1 ha. in area, about 50 kg. of prime seed can be expected annually.

The systematic search throughout Sweden for élite pines of the required type, the collection of seed from them and the testing of their progeny for rapidity of growth so that only the best may be retained has now been begun, and all interested in the promotion of Swedish forestry should co-operate.

FERRÉE, C. J.

635.655:581.6

**The soya bean and the new soya flour.**

William Heinemann, Ltd., London 1929 : 3s. 6d. Pp. xi + 79. 14 figs. tables.

Among the new and beneficial changes that have been established in most countries as a result of the concentrated scientific studies necessitated by the present war, soya bean products have become an accepted constituent of our dietary. The work before us, a translation from the Dutch by C. J. Ferrée and J. T. Tussaud, was first published in 1929 and provides a most readable and informative account of the soya bean, both from the botanical and nutritional side. It is pointed out that soya has proved to be a concentrated, wholesome, nourishing and extremely economical food, rich in protein—not only in quantity but also in quality—likewise rich in fat, minerals and most of the known vitamins, in fact, it can hardly be sufficiently stressed that it is 15 times as rich in calcium as patent wheat flour, 7 times as rich in phosphorus, 10 times as rich in iron, 10 times as rich in thiamine, 9 times as rich in riboflavine, and 5 times as rich in niacine (nicotinic acid), besides being 4 to 5 times as rich in protein and 10 times as rich in total minerals. The 1929 edition was published at 6s. and we welcome therefore the appearance of a re-issue at the moderate price of 3s. 6d.

## NEW JOURNAL

### **The Chinese Journal of Scientific Agriculture.**

This journal is to be published quarterly by the Ministry of Agriculture and Forestry at Chungking. It will include scientific papers on agricultural subjects including plant breeding and genetics. The first number contains four papers of interest to readers of "Plant Breeding Abstracts"; there is a study on the genetics of the dwarf habit of wheat by Pao *et al.*, a mathematical study of the chromosome segregation of pentaploid wheat by Pao and Li, a note on cross-pollination in *Vicia Faba* by Hua, and a general review of wheat cytology by T. C. Chin. The papers are generally in Chinese but English summaries are appended to the more important contributions.

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